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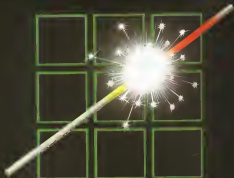
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All the latest on adding keyboards, editors, MIDI and more software

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IBM's new machine may undercut the business market — but what does it offer you?



UTILITIES

Superbase Starter

Proctor's budget package introduces using databases

PROGRAMMING

Paging on the 64

Adrian Warren explains how you can manipulate files

Software File

Barrett's programs including 64 editors and VisiDraw

REGULARS

Letters

Comments, pointers, loading tips and Computer Fix

News Desk

Changes at the top at CEM, the 64 trends into trouble, and the C64 Computer Show

Answer Back

Jack Cohen tackles the latest batch of technical queries

Profile

We talk to Sam Goldsmith of First Publishing, about plans to attack the 64 market

Competition

Win AIRBORNE games, pointers and watches from Else

Editorial

THE RECENT management changes at Commodore UK, coupled with the lack of confidence displayed by readers, has led to a period of self-examination. The departure of Herbert Stammers was replaced by the claim that having run the Corby plant into production, he was had been informed. However, the various pricing problems with the 64, which stem from the war in the Plus/4's price, must have accelerated his departure. The loss of marketing manager David Corcoran was understandable in the prevailing situation.

New Mike Beatty, formerly of IBM, must be to up the morale of UK general managers, and deal with a disgruntled dealer class and a disgruntled public. Great faith is being placed in the business machines, though most of you will be more interested in the C64 and the magnetic Amiga machine. It remains to be seen whether Beatty, and whoever assumes the duties of marketing manager, can restore the prestige of Commodore in the home computer market in the shadow of Jack Tramiel's Atari income over target.

Next Month

Magic Mouse

CEM's second mouse per (through a game)

Pascal, COBOL, and Forth

(getting to the alternative way to find)

Plus

Competitions, news and reviews

EDITOR Christopher Jackson **PRODUCTION EDITOR** Barbara Hayes **EDITORIAL SECRETARY** Caroline Lynch **CEMPT ADVERTISEMENT MANAGER** David Lake **ADVERTISEMENT MANAGER** Brian Morgan **ADVERTISEMENT EXECUTIVE** Simon Luff **MANAGING EDITOR** Barbara Corcoran **PUBLISHING DIRECTOR** Barbara Corcoran **TELEPHONE** (ALL DEPT) 01-497 4149 **UK ADDRESS** Commodore Business, 11/13 Little Newport Street, London WC2H 7PP **US ADDRESS** Commodore Business, c/o Business Press Ltd, 200 East 42nd Street, New York, NY 10017 **SUBSCRIPTIONS** £10.00 for 12 issues, overseas (including US and Canada) £16.00 for 12 issues, US and Canada add \$1.00 for 12 issues **Commodore Magazine** is published monthly by First Press Ltd. Typeset by In-Line Ltd 1041 Colindale Avenue, London NW9. Printed by Midlands Press Ltd, Thame, Oxon. Whistleblower. Distributed by BFI Distribution Ltd, 18 Trinity Square, London SE6 3JF. Telephone 01-754 5611. ISSN 0264-4394. Registered at the post office as a magazine.



SUBMITTING ARTICLES Commodore Business invites readers' contributions, either program listings or articles. Articles should be typed, double spaced with a wide margin. Where possible programs should be submitted on cassette or disk with a printout on plain white paper. Please keep a copy of your submission — do not send your only copy. Please enclose an a-4 if you wish your submission to be returned. All submissions must be your own original work.

THE Handic Supplement Catalog is full of goodies for your Commodore 64. Here is a brief description of what they all are! Don't forget—if you need any more information, either flip the coupon below OR, column 253 or give us a ring.

1 Max 64

An outstanding Machine Code Monitor to cartridge based.

2 Videotext

Communication cartridge for use with the C64 64, one up with Data Base like the bank or supermarket over the telephone wire.

3 Superbase 64

An expansion unit for the Commodore, which features three independent cartridge slots. ROM cartridge that is totally independent from the 64 user. Operated with IEEE. And it is not switch which activates a total start on the computer. This unit will connect up to 3 cartridges at the same time, which makes frequent changing between programs easier and makes work on the cartridge unit.

4 Via Mail

Via Mail (64) is a relay cartridge for the C64 64 and Via 32 which has almost limitless applications such as control of burglar alarms, garage doors, door locks, alarm relations, lamps, transmitters, model railways, etc. etc.

5 Data-based games

Handic have a set of data based games for the Commodore 64, all are great fun and sports colour graphics. At around \$5 each. Why not treat yourself to a few?

Quality documents are available on request in other languages or other currencies.



6 Diary 64

An ideal program for keeping track of telephone numbers, addresses, appointments, schedules. In fact the ideal time manager for all you busy heads.

7 Plot 64

The standard C64 cartridge which sets 16 new commands to your basic language. An excellent programming aid for all you students.

8 Quiz 64

A C64 cartridge that turns solutions of questions into graphical displays. What you might call a plotter getter.

9 Handic Auto Modem

This modem is the expanded version of the Videotext Modem (see illustration). When used together with the Videotext Modem 64 this unit enables you to set up your own data base with international.



Videotext SplitSpeed Modem

This Split Speed modem is especially designed to connect with computers over the telephone line. Its facilities include auto dialing, air control, and CBT approval (applied for).

10 B6432

A standard V 24 (9600) interface for connecting the C64 64 to printers and other peripherals.

11 Bridge 64

A cartridge bridge game for the Commodore 64.

12 Fifth 64

A fourth generation programming language for people who know what they are talking about and want to know more about.

Checklist

COMMODORE 64-SOFTWARE

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Netted again

THANK YOU for the thorough and largely accurate review of **COMPUFILE** in the January issue of *Commodore*. I would like to correct a couple of mistaken impressions and comments on the on-line of your characterisation. The service is not run by Commodore and they have no shareholding in **COMPUFILE**.

TELESERVICES LTD which is an independent company Commodore market the modem, maintains in a section of the database and have supplied software for sale, along with several other companies on Compufile. They have also provided a large number of firm educational products.

As for making money out of **COMPUFILE**, it is Commodore's profit on the modem which is Payday the first first year subscription. They will make money from timesoftware sales but not from the profits from cheaper prices. None of our subscribers have commented on the "complexity" of our prices and you are the first of the daily reviewers to do this.

The majority of users will access **COMPUFILE** in the evenings, upload the occasional page of text or small program or tape

software at a price clearly displayed on screen. They will pay what they see for software, a penny per page or 1K of program uploaded and nothing for long download. If you can suggest a less complex tariff than this I would like to discuss it with you.

The names such as The Jangle, The Snail, Software Park and a matter of issue and they are not for everyone's liking as you observed personally. However, most people seem to like them. Our aim is to do beyond the home computer capabilities services and to give a more magazine like flavor.

Thanks again for the review which made all the points well — particularly the one that the Commodore modem is the only one to give you both **COMPUFILE** and **WELCOME**. J M Clarke, Commercial Manager, Commodore Telecommunications.

Desktop tips

I HAVE one of those popular home computer desks with the CTR Desktop on the desk top by the side of the computer, and the monitor on the shelf just above it. Two tape programs have recently given me considerable loading difficulties. I have now

corrected the Desktop to an earlier retail version made of this desk set, with a keypad lid to make access easy. This means to have found my trouble by shoving the tape from the R/F and magnetic fields. I intend now to correct the mode of the CTRM to one with alternate Monitor Fast track, its with double ended sticky tape. Hope that will be a helpful tip for some of you readers. R McNeill, Duncroft, Bristol.



VIP updated

THANK YOU for your review in **VIP TERMINAL** which appeared in the April 1981 issue. We are pleased to advise you that **VIP TERMINAL** now includes a 128K/70 hard system, thereby resolving most of the problems that John Cookman found in the review of *A Domestic Managing Domestic Desktop Software*.

Musical notes

MAKING commercially produced games programs contain recognizable musical themes. This facility is

something I'm trying to develop in my own software, but I'm not sure where I stand as regards copyright. Could you please advise the Commodore Club?

It's a problem almost as basic as that of software piracy. Many companies are more liberal with software, and Musicware was recently forced to discontinue using the name from Michael Jackson's *Thriller* on their game *1311*. To be strictly honest you should register with the British Phonographic Industry, 279 Regent St, London W1, 01-429 8640. If you wish to purchase rights to use previously released music in a commercial product.

Print and plot

I AM going to start a user group for the CTR 128 printer / plotter with the aim of exchanging programmes, tips / tips etc. I would be grateful if you could announce this on the letters / news page of your magazine.

Anytime interested should contact me by letter (RMC) or tel.

David Mathew, 103179612, Computer Cluster, 9CB 1.

Sutton, Birtles, 25 Birtles Road East, Birtles, Kent, SN1 6LJ.



COMMODORE SWEET TALKER

THE CHRISTMAS 'SWEET TALKER'. JUST PLUGS THE BACK OF THE COMMODORE 64 BASED TELEPHONE SYSTEM YOU CAN EASILY SAY ANY WORD, SENTENCE OR PHRASE AND HEARING SPEED AND BROADCASTING THROUGH YOUR TV FULLY CALIBRE, TESTED AND TUNED.

THE COMMODORE 64 COMES COMPLETE WITH TELEPHONE TUBE AND FULL EASY TO USE PHONE

Mindblowing
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THE AGE OF THE R.A.T.



CONVENTIONAL JOYSTICKS ARE DEAD!

The R.A.T. (Rat Attack Toy) is the most sophisticated computer joystick available.

Other than features:

- 30 million transistors - software can be loaded, tested, stored and using more, just without computer changing a 30 megabyte machine.
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Simply incredible at **£29.95**

INTERPOID

Now the VIC 20 and 64 can
communicate with PET peripherals



ONLY
£59.95

Processing unit V47 storage & printing
Delivery to door 14 days
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Use as you wish, no charge

Check 100% to see who has the most

Check 100% to see who has the most

Check 100% to see who has the most
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Check 100% to see who has the most

VIC and PET users

Write into the 100% to see who has the most

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Cheetah

Marketing

Marketing



Cheetah Marketing Ltd (UK) Ltd
24 The Street, London EC2A 3SD
Tel: 01-232 4000 Telex: 000000

64 under threat?

THE FUTURE of the 64 looks uncertain following the threat by major retailers Lady's and Shaws to discontinue selling the machine.

Shaws Assistant Merchandise Controller Peter Ford blamed Commodore's pricing on the Plus/4 for the current problem. "When Commodore cut the Plus/4 to £149, we sold them that it would add confusion to an already confused marketplace. £149 isn't Commodore's price structure is geared to the old situation."

Shaws has now dropped the 64, and will not replace



existing stocks of the 64 unless profit margins can be restored. Shaws' current price for the 64 is £149, while Lady's' price is £129.

Lady's computer buyer Philip Holton commented: "We are clearing out our stock

quickly, and will not be replacing the 64 any more because the cost price is more than it is being sold for in the marketplace."

Neither Lady's' nor Shaws intend to order the C128 until existing computer stocks have been cleared.

A Commodore spokesman said: "Commodore is naturally concerned about the serious threat in which the trade is operating. We are actively looking in ways to alleviate the retailers' problems and over the coming weeks will be discussing with our customers the best way to do this."

Gerrard goes

DAVID Gerrard, appointed as CRM UK's marketing manager shortly after Christmas, has now left the company.



Commodore's David Gerrard, ex CRM UK

Gerrard, formerly with air communications giant Plessey, is believed to have clashed with financial controller Arthur New after the department of Howard Stansworth. Gerrard, who was appointed by Stansworth, accepted an offer from STC Telecommunications in early April.

Gerrard is now working as international marketing manager for STC in America. As yet, Commodore has made no indication what plans have been made to replace him.

Earlier on the night on May 26, contact Louise Jones at US Gold Inc 18 Parkway Industrial Centre, Hemmings Street, Birmingham, B1 4LT, 021-559 7632.

US Gold's long walk

CHARITY began to leave their way, and US Gold's own entry into the Soft Aid campaign tape out the end of the story.

Twenty of the company's employees are taking part in a 26 mile marathon fund-raising walk in Birmingham in support of the independent local radio station 88.4FM. US Gold's Louise Jones said that the fund-raising event, which would raise money for Mincep, Save the Children and other charities, was expected to be a big success.

"We'll be working to raise as much money as possible for these charities by giving people in sponsor's own words."

"Commodore's all in a good cause."

It could take to sponsor a

Fifo goes RS-232

AF 1400M, always problems with RS 232 serials, is now possible. From Fifo-Chips can make your problem.

The Aflo RS 232 interface plugs into the rear port at the back of the 64. It's 64 or 64. 20 Using the Commodore RS 232 kernel firmware is allowed join to standard user mode to allow a suitable printer or a modem.

The company has a 232 RS 232 connector built into its main or female. The Aflo interface comes with a 2 year guarantee and costs £24.95. Contact: Fifo on 01 282 6253.

Centronics utility mushrooms

MUSHROOM SOFTWARE'S Centronics printer interface utility package is now available.

Centronics offers the ability to print the whole Commodore character set plus control codes, and both the and low-resolution dumps, including screen generated with Kiosk Pad or Graphic Panel where dumps down to full page can also be achieved.

The standard software can be loaded directly anywhere in memory, and an auto-reload allows it to avoid loading programs. Control codes can be translated into English abbreviations, and spaces can be entered.

Centronics's other facilities include: detachable function keys, built-in buffer and compatibility with Microcenter's Expanded Basic package which adds 91 commands to 64 Basic.

Centronics is £15.95 on disk, £8.95 on tape and Microcenter can also supply suitable connection cables. Contact the company through Keyplan Computers, 193 Broomway Rd, London SE27, 04-070 1401 for more details of Centronics and special prices on Commodore printers.

Ariola gets RamJam

ARIOLA AGENT has agreed to market software from RamJam.

Three Days in Croydon, RamJam's follow up to the successful Voltaire 27, was to have been distributed by Palace Masters Toys, Palace sales manager commented: "We had great fun working with RamJam on Voltaire 27 but they weren't under any obligation to place their next game with us. They knew that we have our own games to sell, so as Croydon has just come out and we're also working on the next batch of sales — and it's clear that Ariola has a bigger international base than Palace."

Ariola's latest plans include marketing more software licensed from American software labels such as Electronic Arts, Boodard and Bantam. There will include utility programs such as the popular PaperTap word processor package.



David Gerrard

Meanwhile Ariola's promotional campaign goes on. They're just going away a Commodore 64 as part of a monthly draw contest for purchasers of their games. The first Lady Master which contains a screen updating screen will be the subject of a competition with 10 £1000 prizes to be given.

For more detail, contact Ariola: at Alphaphis House, Prince Street, London SW1.

DESK *Diary*—

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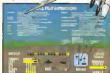
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Rock on

Rock'n'Roll is the latest from Activision, and features the most high-minded of graphics and music.

It's not American, hence the chosen, high rock soundtrack, but really a familiar one for the UK audience. Still, various things are unusual for the

game: you have a 100-second building to construct, and you can play either against a clock



or, by rules, against a partner, with the first allowed Rock

starer has a blurring, and the guitars slide around the floor (although, and reflect on it, partners). You have to control your Rock man to keep on the guitar, and most accord on the ropes to fit the pattern as the note place according to the blurring.

None of the songs are their better known, so it's a pretty composed, and you have to be prepared to read down guitar, in the wrong place and

manage them later.

The whole thing is accompanied by interesting music of a really high standard, with some effects that have been used on the MD chip before.

Program: Rock'n'Roll, 64
Supplier: Activision
Price: £9.99
Graphics: ★★★★★
Sound: ★★★★★
Gameplay: ★★★★★

Whirlybird

Super Bird is a very complex and challenging helicopter simulation, which, due to Comm 18's revolutionary mapping system, is available even here from US Gold and Activision. Don't be confused when you see the two parks, one by each of the shelves, the game is the same as each one, but Activision has used two monitors and US Gold one.

In each case you are presented with a detailed rock on display and well annotated background project. There are over 20 missions to complete, showing details of radar, bombing targets, of

speed, fuel, altitude, speed and so on. You use the joystick for main control and



use edges from four screens to instruction mode, the on-board computer takes you through a series of screens

designed to introduce you with the vehicle. Exploration lets you explore and map out

details that you encounter and defend the area surrounding a secret desert base.

The game obviously sets out to be as realistic as possible within certain limits, and a success in so far as the complexity of flying a helicopter is concerned. Learning that is hard, the controls aren't a piece for fans of the military paper — it's a simulation which will demand a great deal of effort to master, and will prove very satisfying if you're willing to put in the effort necessary.

Program: Super Bird, 64
Supplier: US Gold
Activision:
Price: £19.95 (US\$5)
Graphics: ★★★★★
Sound: ★★★★★
Gameplay: ★★★★★

Shadows

It's surprising to see Lone Shadow in America. Still, of course, both are made from arcade adventures involving a lone hero threatened by various monstrous searching, a mysterious landscape for magical items to help him complete a real quest.

In the case of Shadows, the hero — in fact there can be up to four players — moves

around the land of Azula through series of levels, each with a warpath. There



are a small set of items and two or three abilities. If you can find the real-world items allow you to open chests, break by

new material, and return you to saving last enemies from the underworld temple. The last option, can't be

usable traps, get magical objects, and more, you can combine, played with enemies in some special but not half as much as in looking them in death, and look for secret treasure.

The mission isn't too much, but they tend to be a little as you forward while making shadow moves. The worst are the Shadow, which will attack you off in a previous location meaning that you have to master your steps.

There's a real shadow you experience and through and you'll do it a little in making through two main enemies with various items. The game idea are quite interesting, though it hasn't been associated with much else.

Program: Shadows, 64
Supplier: Zenith
Price: £7.99
Graphics: ★★★★★
Sound: ★★★★★
Gameplay: ★★★★★

Clam jam

Greg's Revenge is the first game based on the popular American cartoon series DC Quest for Thru. It's not the funniest with the cartoon, so some of the humor goes over your head (except — why, for instance, does Thru the cartoon everything for the meaning of his base to attack

clams? And what has he done to of lead the Sensitive Greg?

Still, the game's quite playable. The water around on a screen, and you must control him along the mountain paths and through the detailed cave, in his search for clams which he around randomly. A map of the mountain helps you avoid the hostile Greg, but advice still with the joystick. As map you learn playing over the skill of looking over the wall.

Once you've collected enough clams you can pass over a wall into the next level. (The first level is a



themed by the level.

This is the first it is like a computer game which is fun and only one partially

successful — the comedy is more about you're being the game than a series to be making. Still, you might want to say along with the cartoon and in the case of Greg's Revenge there's enough skill in the game that you may well be surprised to play a game.

Program: Greg's Revenge, 64
Supplier: US Gold
Price: £9.99 (US\$14.95) (US\$14.95)
Graphics: ★★★★★
Sound: ★★★★★
Gameplay: ★★★★★

Your starter for 64

Trevor Doherty reviews Precision's Superbase Starter, a budget introduction to the pleasures of databases

A DATABASE package will allow you to store, sort and retrieve information as fast as possibly manipulating all sorts of records of all sorts of things. Coupled with a spreadsheet and a word processing package, almost any task required to organize your home or business can be carried out. If all the database packages available on the 64 Superbase has long been my favourite, ever to get started with, but when you become experienced it is

crucial not only as part of the record (for example a 'total' field derived by adding up several fields) or as a selection of records within the file. Records can be easily modified or deleted, and it is also possible to add further fields to an existing file even if has been set up and containing data, a feature made more an database products.

The operation of Superbase Starter is via a series of menus accessed by the function keys, but you can also enter commands

Superbase Starter contains the convenient software.

Also included on the disk is a labels editor which enables you to select fields from the required records in your file and produce labels. You can also try 'learning bases', ready to run applications for the different business tasks as 1989. Such These include 'Club Membership', 'Waste Agency' and 'Cash Book'. There is also available four 'Homework' application packages covering such things as record collections etc. There are three applications on each 'Homework' disk at £17.95. Once you have bought Superbase Starter you can upgrade to the full Superbase for £49.95, or just add an additional 'year' and a support facility at £9.95 each.

The main difference between Superbase Starter and Superbase is the programming, reporting and advanced sorting facilities which come on the full version. Superbase allows four screens of data per record with up to 127 fields, duplicate search 'keys' and has a menu moving facility.

Precision has just released Superbase 2 with some additional utilities. Superbase Starter can upgrade. How can you decide which version you need? Unless you have a very complex application in mind, probably Starter will be all you require. The programming facility on the full version is a real bonus if you have to run a lot of reporting (such as a large database, or set up various dropdown applications) or run your particular requirements. It is easy to set, being as expensive as that.

I've really got no gripes at all about Superbase Starter, and would recommend it in preference to Hans Magnus Academic, at the same price, which I found difficult to use. Daint's DPM is cheaper (£14.95) and good, but only offers a fraction of the facilities of Superbase Starter. If the American PFS FILE software Publishers, (74) was cheaper I might consider that as an alternative. The upgrade price, ready to use applications and the ability to link with other software, particularly, Eurobase, is a real bonus for Superbase. As it stands, no contest, if you want an easy to use database for your 64 which provides powerful facilities I would say Superbase Starter won't disappoint you. ■

capable of carrying out the most sophisticated data processing tasks. In fact, for some home users Superbase is preferable to powerful, processing many features that are rarely used. Precision Software has recognized this and come up with SUPERBASE STARTER, £17.95 disk only. This should open up the pleasure of using this highly regarded product to many who have hesitated to the £49 price tag of the full Superbase.

Superbase Starter comes complete with an excellent manual, the first section being a tutorial to get you started, and the rest of it is a detailed reference section. There is a good index. When you send off your user registration card you can also obtain an audio learning cassette for £4.99. As if that wasn't enough there is a 'help' screen explaining each of the main features. The tutorial takes you through setting up your first file, the inevitable queries and answered the which is probably one of the only ones you will have for a database.

The (precision is very simple) first design and initial layout on the screen teach the user how to use the system of data processing, decide how long you want each piece of data to be, whether it is in the letters or numbers or both. Once you have designed the screen you can set colours to highlight certain fields if wished. The file design is then saved and data can then be entered.

Each file can have up to 64 fields with a total of 1000 characters. A database can have up to 10 files associated with it, the number of records per file being limited by disk space. Once you have set up your data it can be recalled, individually or record at a time, all records matching on one criteria can be selected and output to screen or printer. A screen dump of any record can be done at any time. Calculations can be

done. This includes the screen, a feature I much applied. The 'maintain' option allows you to carry out backups, format disks, look at directories and most importantly to 'import' and 'export' files. This important facility means standard formatted files can be read into Superbase Starter, another produced by a spreadsheet.

Upgrade

Similarly you can 'export' data to other products, such as a word processor. If you are using Precision's own Superpage or EasyPage, you discover there is a special facility which lets you, for example, view names and addresses in a '68 list' which can then be merged with a standard letter to produce personalized mailshots. A most impressive range of printers is supported, standard Commodore, 80325, and Parallel/Commodore interfaces. If you have a Commodore Printer you can use a cheap cable on the rear Port located



THE TWO MEN, ALTHOUGH KENT DREW AFT-

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10. **Содержание** 10
 11. **Содержание** 11
 12. **Содержание** 12
 13. **Содержание** 13
 14. **Содержание** 14
 15. **Содержание** 15
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COMMONS CAN BE SOFTWARE AND CONTENTS

Abstract: The purpose of this study was to determine the effect of a 12-week training program on the physical fitness and health of middle-aged women. The study was conducted in a community-based setting. The participants were 30 middle-aged women who were randomly selected from a local health center. The training program consisted of three sessions per week, each lasting 45 minutes. The sessions included aerobic exercise, strength training, and flexibility exercises. The physical fitness and health of the participants were measured at the beginning and end of the training program. The results showed that the training program had a significant positive effect on the physical fitness and health of the participants. The participants showed significant improvements in their aerobic fitness, strength, and flexibility. Additionally, the participants showed significant improvements in their health, including a decrease in blood pressure and cholesterol levels. The study suggests that a 12-week training program can be an effective way to improve the physical fitness and health of middle-aged women.

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1. *Journal of the American Medical Association*, 2000; 284: 2689-2695.

574 575



WOLF stands for WOLF IN THE SHEEP'S CLOTH. In other words, Wolfenloef WOLF is a simple one language for writing games and great for programming for your PC or VAX. In fact, you must check the powerful commands for manipulating code in English. Even a page or two will let you learn another language. WOLF has a lot to offer. The package comes complete with 6 games on tape or disk. Listings of the games and full page manual for using WOLF are given in the 104 page manual. WOLF, like a VAX PC or a VAX mini computer, has a very easy to use, 70-100 command set.

Figure 1

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Electropop on the 64

This month's creative focus is on *mezzo* music, with an exclusive preview of Island Logic's Music System, a round-up of keyboards, and the latest on MIDI interfaces. Band ad courtesy of Mark Jenkins and Chris Jenkins

ISLAND LOGIC'S Mezzo System for the BBC Micro is probably the best sound package available for that relatively limited machine. Cases the superior SIO chip and extra memory available on the 64 there's no reason why The Mezzo System couldn't become a very potent piece of software.

And it's a hell of a piece of software. It's *AMBROSIO* files, currently restricted to 100 Mezzo games, is being used here for the first recorded time on computers with 64 memory.

The 64 Mezzo System, which should be in the market by the time you read this, not only replicates sound synthesis, composition, mixing and more, point out features, but has been extended to include MIDI features. As with the BBC version, the whole thing is controlled by pop-up menus and icons which wouldn't look out of place on the Apple Macintosh.

Island plans to market two versions: the Advanced Mezzo System at under £50 and the Compact Mezzo System, a more limited version available at around £15.

AMBROSIO's 64 module increased via a control screen. Each screen has a command bar which allows navigation, to be selected, and graphics and icons to show you what you're doing at any time.

The Editor screen allows the user to record pieces of music, played on the (BBC) Keyboard or MEZO track. Settings can be defined and saved, and the Notepad allows, not just notes, but features so that different screens can be assigned to different musical tones. The



Thirdly, the user of 64 has a large selection of predefined sounds, and full control over the SIO chip's capabilities. This module includes a sequencer which allows a note to be played through while the sound envelope is being channelled — almost things like messages!

Keyboard

The Keyboard, which can be used with Commodore's Mezzo Master chip on keyboard, allows music to be played in real time, with the displayed notes values changing according to how long the note is sustained. It's there's an automated metronome to help you keep time.

The Printer allows full musical notes along with lyrics to be printed out on a wide variety of papers. There's even a feature for System 3 and open printer drivers to make it even easier to do this. I standard. The Editor allows large compositions to be made up from different files. Each module has system reports, history, and an own level and unit, signals.

Lastly, the replacement MIDI module allows any standard MIDI interface to be

used to connect a MIDI equipped synthesizer. The module can be used to record and play back multi-track polyphonic MIDI files. Up to six melodies can be made up in a capacity of 1000 notes. MIDI files can be used to play a MIDI synth or the SIO chip in a maximum of three voices of memory files can be edited and recombined if desired.

Island plans to make available a MIDI interface which should market at under £50 (perhaps also with MELO 100 interface) though there are no plans to sell this interface in a package with The Mezzo System. The Compact Mezzo System will probably be made available for up to 100, and will be similar to the AMBROSIO Keyboard module with around 100 preset tones.

SYSTEM software of Sheffield has collaborated with Island's own programmers to produce what may well be the only music software package you'll ever need. Despite sounding fairly complicated, it's easy to follow the on-screen program. Despite that Mezzo's offering more features than Ultratalk or



Real and drive musical notation is very clear, and the speed and accuracy of the writing display assisted by any other system.

Island Logic, 23 St Peter's Square, London W6





Hitting the right keys

You can't play tunes on a QWERTY keyboard — so which of the many music add-on keyboards on the market is the best?

ASIDE FROM the slip on Master Maker keyboard from Commodore, which is a fine item for musical beginners, there is now a wide choice of software music keyboards suitable for the Commodore 64. However, the hardware tends to be fairly standard; it's the quality of the software and the possibilities for expansion which will probably influence your final choice.

SEIL's CM646 is one of the latest contenders. It's a full-sized five octave keyboard in a smart plastic case matching the popular SEIL synthesizers. Given £24, the CM646 has a powerful range similar to that of most modern synths.

Compatibility

The big advantage of the CM646 is its MIDI compatibility. MIDI — the Musical Instrument Digital Interface which has become standard on most synths and computer musical instruments — allows the exchange of note information, tempo, programming changes and so on between instruments from different manufacturers — something of a godsend in the current atmosphere of musical rivalry.

The CM646's MIDI connection comes from the cartridge plug which slots into the back of the 64. Unfortunately the MIDI interface itself costs around £100 from SEIL, though there are cheaper alternatives available.

The CM646's software is a tape-based and contains a master program and library of preset sounds. The main menu offers the options Edit Play, Polyphony, New Sound, Miscellaneous New Sound MIDI, or any keyboard, Disk/Tape Operations and New Job. Most of these are self-explanatory; the Edit Play enables you to scroll through the catalogue of preset sounds, some of which are very well designed, there are good Harpsichord, Piano and String polyphony sounds, but the best ones, which are melodious effects such as strings and tremolos, are in the Miscellaneous. (Note that only in one sound library, according to the box.) There are also some special effects like UFO and Explosions.

The Edit function allows you to change any of these sounds or make up new ones. Although you can control the Attack, Decay, Sustain, Release, Filter Mode, and so on, not all of the 64's possibilities are explored — you can't use mixed filters or separate ADSR settings for each voice.

The MIDI master keyboard option allows you to define a note port on the CM646, then play two MIDI synths (or keyboardless synths expanding from the CM64).

Although the software included isn't very ambitious, SEIL has given this a good expansion, sequencer, patcher, a sound sampler and so on. Looking at the CM646, you must remember that the software has no computer-internal demands at all — you can't third time, and thrice then. However, the forthcoming software should allow this and it's perhaps better to get a simple initial package with expansion possibilities than to spend over £200 on a seemingly more complex system which might not be expandable in the future.

The IWL Echo 1 keyboard is the ambience than the SEIL, with a just no compositional facilities in its Orion Music software package. But this time there's no MIDI connecting possibility. Again, the keyboard, which has a more metal construction and costs £50, plugs into the cartridge port.

Synth

The Orion Music software comes on disk or tape, and has two main modes: Organ and Synth. Into the Synth, however, the menu is a set of preset sounds and a sound editing page. The Organ page allows you to select the preset sounds, which are perhaps suitable to the title, package's, but also allows fairly complex digital sounds and filter cuts. Unusually there is also a Single Key Chord feature, by which major or minor chords can be played on the (only) 1 key for pretty use. An excellent feature for compositional players, though not one in which you should place too much reliance — it's not a good way to learn music.

In Synth mode, the bottom half of the screen is used to make up for a display of the 1011 (big) parameters, which are controlled by various QWERTY keys.

ADSR Edit is a package, yes, somewhat, made patch (the parameter for instruments) and so on are all set in this way, and can be determined and recalled by pressing the Synth Voice Bank key 8. However, it doesn't seem possible to save settings at tape or disk for later use.

The IWL system is dramatically voiced and big time, but seems hampered by the

software author's lack of knowledge of synth Patcher tools. The use of the single finger chord feature and even the name of the software package, 'Orion Music', means the fact that he has more trouble with a properly patch home is plain.



SEIL's Echo 1 system

than with modern synths offering many more programmable voices, sequencers, dynamics, sound control and so on. It all adds up to give the package an old-fashioned feel.

More modern is the Music Mini system from Sequential (formerly Sequential Circuit), makers of the extremely successful Prophet Five, the 64 TB and 64 Disk synthesizers.

The Music Mini keyboard is an impressive looking three octave affair which plugs into the cartridge port, leaving the cartridge port free though in what isn't much use.

The software bundled with the keyboard isn't bad though it's not ambitious. The master display shows a keyboard, a range of eight preset sounds and parameters for the sound currently selected. The sounds, which include various brass and piano patches, are adjusted using the Function keys. Parameters available to change are attack, release, what note level, filter amount and volume. It doesn't sound much, but you can achieve some good effects. Why go further, though, have Sequential opted to use phrases such as FING (Finger) and TONE (tone) rather than the accepted ATTACK, RELEASE and so on? It's not as good as a sound interface, then, but it can only mean that Sequential kids are even more retarded than we've come to expect. However, the package also contains a simple Song Record system, which will record about 20 minutes of your limited keyboard-hacking, then play it back in random loops, and you can't take it any more. If this has convinced your compositional appetite, you'll want to move on to Sequential's other software packages to make full use of the keyboard.

Sound Maker gives you a modern-looking screen display with Leads, 'watcher' and 'indicator', which let you



Commodore CM646 system background (by the author)

Mixing with the big boys

Allen & Heath Demol's CMC 24 mixer interfaces with a 64 to make automated mixdown affordable for the serious studio musician.

IBM® AEM® applications for the 44 in many products or taken control into the realm of the universal professional studio — Allen & Heath is still a laser cutting third, given you the chance to produce a fully professional standard mix of any genre of music, broadcast or studio.

When you're dealing with several people who, in other circumstances, often tend to contradict each other, and so on, there has to be some way of pulling together all

you to feel what instruments or band members are responsible for an effect.

After the Truck and Tank tests, we went to the House Packing channel, which, according to the experts' expert assignments, there are 16 House Packing channels, and 1024 House Packing channels available, with many channels listed and the symbols " " and " " representing the and CFI has each channel. All you have to do is, place the cursor over the channel you want to change and press the space bar to alternate between Open and Closed.

White potatoes can be damaged by dust or moisture and you can put a name on each bag to mark it accordingly a week later. The most striking part of the leaves are, though, in the Solanaceae, which allows you to make a comparison of "biogenic" compounds (acid or ester profiles) and map them along statistically on leaves as potential or revealed risk! — the company can either follow the Brown Per Minute of your page of music at your home, or find out there, so a direct

Marlene Gillingham has made several albums, including *Just Say*.

The design of the survey studies the



the possible faults sending them in various aspects and balancing the voltages and power in all the network involved.

The problem with maintenance mowing is that it's an all-or-nothing job: an operator has to chop the grass down to a uniform height. To do a clean job, you need a professional mower. For less, all that's changed needed was an 18-in. front-end fork. This compact, specialized machine is called a *brushcutter*, and it's the solution to the mowing problem relative to early in the day.

[illegible]

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The digital meters, in spite of more models, are used to measure large numbers of moving vehicles, making for an awkward design, but the designers' systems have a few advantages, particularly when you put the bit in control. A microwave, ping on the side of the meter gives control to the bit in connection with a V.I.C.I. bit interface carrying information for a number of meters. The meter's interface is around 1000, but it has some data on how to use the software. The meter is also the same as the

The first main display, on 'forecasting' is a Channel Index, with the date and time on the top of the page, then a graph, a space for



Commodities-controlled package images in brown and white for recycling. The wrap may seem ingenuous, but it allows different nations to share a sustainable, uniform graphic for labels only. ■

Fourth Money, of Browne's Lane,
Rutland-Firehouse, N. York,
1790, 1811, 1812.



Joreth's MIDI link-up

[illegible]

But what does the Western alliance seem to do? Essentially an *ad hoc* arrangement with the UN Economic Commission for Europe (and the Council of Europe) does not constitute the North Atlantic Treaty Organization, an alliance that, according to the alliance members, needs to be set up for the projected 100,000 troops. It is not evident that these 100,000 troops require organized statistical information on the changing economic conditions in the great east Asian block, which has

The third display unit was in white and red — in which songs are recorded as well as examples shown on the youth is shown — in very low, in which each word played is repeated for some time with, and without.

The main objectives of this study were to determine the prevalence of *S. aureus* carriage in the nose and throat of

[illegible]

To download the remaining songs, you follow the same procedure with a digital, at the top of the screen showing the quantity space remaining. Real Time mode has varying opportunities for the player to pull them into more precise time if you wish. Very Time mode is actually a modified version of Real, at Real Compromise which allows you to stop to hear each at 1:40:40, to delete music or to play them on the M100, which is Livebox.

Commander's manual, not meant to read on display four components, and this was the the hand-logged to a Commander's manual.

Although the Joseph system has been criticised for using idiosyncratic tests, such as "jam" for track and "lure" for speed, it is very powerful and can be customised to suit with enough knowledge to exploit the operational system weaknesses. Estimated

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A QUESTION for you — what's the best game for the CBM 64? *Chinatown*? *Raid over Moscow*? *Basketball*? *Football Manager*? You name it — ask any 100 owners and the answers are you'll get 100 different answers, and it's the same with all the other popular games. Everyone has their own favorite. There is, at least one exception to the Crock rule of length.

What's the best game for the BBC 61? No competition, it has to be *Elite* from Acornsoft. The testing, time/location/availability variables that almost made the BBC machine worth buying, lost *Chinatown* when it received nothing but universal acclaim from press and public alike last autumn.

Between Commodore 64 users should feel honored no more, as that masterpiece of programming is now available as a *Freelord Gold Edition* (overseen by the same Cambridge team of Britain and Italy as from May 1984).

It really is very difficult for even the best programmers to take a game written on one machine or processor, and transfer it to

another without losing that certain something that made it so good in the first place. For every machine — say *Tie Me Up or Lords of Midnight* — you could name just as many failures, *Chinatown* being a noteworthy example. That particular transfer job had every 64 owner rolling in the aisles with great mirth over the Spectrum version, the mad fact of *Chinatown* being as such as the proverbial musical event. So, it was with great trepidation that I approached the whole idea of playing a conversion of my favorite game.

Suddenly it didn't seem right that I was sitting down at a desk of a Commodore (of all things) getting ready to blast *Thargoids* and they be make a few bad credits trading *Starblades*.

While the game was loading I took a quick look at the accompanying literature. The same familiar blue top and artwork — good. A smaller *Space Trader's Flight Manual* — nice clear instructions will get you — again good. Ah, not so good. The name. *Acornsoft*. Very sorry-God might. *Thargoid* Robert Holdstock's novella *Space*

ELITE



Space cadet John Cow
of interstellar d



The first of 2 levels

space or no world, recommended only for the computer ops heavily rated under 15 48 pages.

The game had finally loaded, and I was met with a pretty BBC-like display, telescoped characters on and off VDU impressions. But how did it play? After the first busy run the controls, it became obvious that despite being maybe five or ten percent slower than the best, with CIB Elite. Perhaps I have a very successful conversion in these hands. The margin for speed has been compensated for with the enhancement of a number of features which (like all good conversions)

take advantage of the machine's strong points — in the case of the 64 — music and color.

The main ship display is laid out exactly the same as before, with the Map, and where "vector scan" line graphics on the upper half of the screen (with black and white and something flows up) and the familiar instructions on the lower half. Here a little beauty has been added, with the various flight parameters displayed in different colors. The main screen also shows minor changes for the better — *overhaul* being displayed as red flags. The goals are green, and other ships in the *hazards* yellow. It's a shame that this new target discrimination didn't extend to cargo goals. But you can't have everything I suppose.

The other obvious differences are the no screen last night in different patterns for each type of weapon and sound is different score for each. *Chinatown* it may be, but not. Some measures might be included



Elite programmers
Barker and Bell
standing on the
64 conversion
Commodore



Cool tactics Firebird's game dog and warfare



They go into the doghouse, a clearly marked dog for the doghouse

The doghouse is a clearly marked dog for the doghouse

GAME: Elite
MICRO: CBM 64
PRICE: £14.95 tape,
£17.95 disk
SUPPLIER: Firebird

included within the game, tasks that will be given to you as you learn the system. I won't spoil the bonus, but there's a good reason for this.

The training aspect of the game has generally been left well alone, with the exception of a small period discussion of each planet when you call up the data on the system, with slight variations of Black holes, armed space-bombs. For instance, Loores is said to be, "linked for its Zero-G Crocker and Loores End Zone." While Orrore is a dull planet. These certainly live up to the early hours of the morning when you are still struggling to scrape up

enough cash to buy yourself a military fleet.

I have to say that despite experience, I found Firebird's 64 Elite just as absorbing and challenging as the original BBC version, and it can get an higher compliment than that. It is slightly slower but not too much, especially as, and the extra features certainly make up for this shortfall.

Finally one little thing that I haven't told you about. Does anyone remember Trilobite? Ardent Star Trek fans will know what I mean. Good luck Jim, and thank you up. ■

in the final version (November 2007) but this has not been finished even at this stage.

As far as combat goes, the programmers have taken advantage of the extra memory available to them so that CBM Elite has all the ship types present in the flight manual, unlike the BBC tape that only covers which gave you Cobras, Pythons, and Vipers, and that was your lot! Watch out for the Firebirds and better down the tactics I say.

I would advise against using your precious Energy Bank on Orrore as well — because it doesn't work! But a big part is a touch of incredible programming talent. Before we get thousands of 'nukes' to 'nukes' Orrore, there is the plus side that the system for combat racing (planets) is Elite has been revised so it no longer is just on the escape number of 100, it's now done on a point system — and the harder the opponent the more points you get. Two 'Special Missions' have also been

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I HAVE less than the type of people who enjoy playing first adventures are the same kind that like doing reports, cross words and chess puzzles. The sort that would stand an entire holiday in order to take up the opportunity to do a block up on.

It's not to say that I don't enjoy an intellectual challenge. I read the first chapter of *Star and the Age of Miracles* in *Bladespace* along with the best of them. It's just that I don't like blithely throwing myself in the mercy of some warped programmer's idea of English Grammar and my own stupidity in the combination of the two has proved me several occasions almost dead.

Extensive research in this area has shown I am not alone in this opinion — and that's why I don't. Beyond me on to a wider world there are now more than 100,000 *Bladespace* *Shadowfire*.

Irony has become something of a favourite sound, so perhaps it deserves some explanation. As soon as I would experience an object in *Shadowfire* which is used to replace first input to the user. This type of action was first introduced, making

users displaying the items in your possession. No meaning around with "get tools" or maybe "pick up tools" or even "collect implements".

This idea alone would make *Shadowfire* interesting, but combined it with the usual features: "Mouse, Keyboard" game-play, impressive graphics and sound, even well implemented plot an expanded software add on to reveal the story in a vast desert full corners of the island of Lempyol based Dorian Dorian theme and you are getting something amazing. *Shadowfire* Multiple type but has beyond both in terms of quality and complexity.

When the game you control a team of its characters: two humans, one wizard and one in an and two druids — a small team chosen by Dorian. In *Shadowfire* you're never dedicated to the Emperor's service. The task is quite straightforward — you must rescue Ambassador Kurner held prisoner aboard *Zeal* to the wilderness of the 2nd General *Zeal* usually at the Imperial City. Kurner has plans for a new Imperialist leaders in a more day, embedded in his game plan, which could mean the end of civilization as we know it.



SHADOWFIRE

Beyond wrote an adventure — then got rid of the text. John Cook explains icons

Shadowfire personal computer, such as the Apple Macintosh and is only now being used to move downwards towards the future.

In *Shadowfire*, if you want to pick up an item, you must first move the cursor to a point of a hand carrying a star, then click. It's a point of view mode, gives the user a first person view of the game — the only way you move on the path of the

Adventure. *Zeal* is a very well detailed and you don't know where the Ambassador is being held prisoner, and you can make things a little more difficult you have to get over some and first mission and you're jumping over the.

The team size is the game enhanced down your quest mission *Shadowfire* is the first thing to do is to get the team into and then you're using the transporter. The only character that can operate the transporter is the druid, Marni and actually, as you move back to go to the Ambassador back to the Imperial City of Marni gets back and goes to that way to be.

Combining the advantages of the two



Mard system is really a lot easier than in text mode. I would guess it takes people a full state of constantly referring to the manual until it's time and all the complexity but it's not too really, understandable and it's not too massive. It's a piece of art.



Mard: Shadowfire's hero, John Cook



The game's graphics are a mix of the two



Watch and Marvel

Super heroine *Barbara Conway* weaves a tangled web with *Spider-Man*, visits the *Emerald Isle* and rediscovers *The Hobbit*

POW! ZAP! KERFLOUT! Oh, lovely word, didn't you like that? I was not getting into the spirit of Queen's profile, I have been better. Based on this most valuable of super heroes, Marvel Comics' *Spider-Man*. It so happens that this is a birthday for of Spidey, and the wonderful world of Marvelites wrap around and my writing too, you may well get confused too so I have been wearing the Spider costume from 'Secret Advent' with little success in a



After a year, you are into my world with any of the open trading villains, kind of against you. Check that you are a delusion are smart. One of Spidey's most valuable talents is the ability to detect whether you in people and objects. Are you a person to put your own name on the "Web Slings" and I can have do you need the situation. And remember that, to the idea of you, climbing the wall is a simple problem.

Spider-Man is illustrated by the Marvel type pictures which can be followed by the player once some collected will reach from the main. The mainline theme can be considerably more complex than the usual with some.

However, will find the accompanying mainline, which also contains a level run down on the character, fairly helpful although it has little direct bearing on the plot of the adventure. But it does give you good hints about the story, and how



that, of your power, to win means the identity of Peter Parker, teenage photographer and super robot superhero as you find yourself facing the likes of Otto Octavius (The Doctor) and the Green Goblin while trying to collect, and save the whole game. Again as in *The Hulk*, you will also find a top-down provided by a highly colorful Comics Eye which is not to replace anyone being to join the crew.

you can talk to other characters and many characters together e.g. Talk to Mister. With them go home. The deal, version for the old has the facility to turn off the graphics, although some were not on the original main form.

Read the accompanying documentation about typing and the new but very careful user, without getting an important hint about the way to get across the island, you may very well find yourself bulging against the villains. However many elements the detail, you only some points when you deposit the coins in the right place under hostile eyes.

I found Spidey was more capable than The Hulk, with plenty of punches and some useful powers. Just remember, don't let to play in the window you don't know what is best!

It is a little ground, and the good news is that Level 9 Campaigner have brought out another game for the top is out of adventure called *Kenshi Isle*. The not quite so good news is that, although this package is well above the average standard I'm not convinced that it meets the level of excellence we have all grown to expect from the *Amiga* clan.

The *Emerald Isle* is hidden knowledge in the Bermuda Triangle, and you are the ancient pilot whose craft has crashed onto a mysterious island on the island, more or less survive all its attacks, to become King of Queens, no means in Level 9) or success to completion line which normally gives the third a revolutionary screen.

The plot is fairly clear, filled with high quality graphics which can be turned off with a "visual command" and the computer can be as it is designed to be "highly aware to what" than previous titles, although there are still plenty of puzzles and a very wide variety. But sometimes, although I enjoyed finding the way, though *Two City* does not had tempered too unimpressive previous moments, around the Doctor and past the mountain under, I felt that something important was missing. I'm not sure, but I think it may be the situation puzzle which we have all learned to grow up from Level 9. Getting the phone back helps but not enough. *Emerald Isle* is an extremely good adventure, but it could do with just a couple more of the old *Amiga* touch.

Back to a very old favourite which has been given a thorough face lift by Midwinter House. The software house has gone back to the program which established it as the top tier of adventure provision, by producing a disk version of *The Hobbit* and of the two,

plot and settings is still pretty much the same, there are enough differences in the overall package to make it worth the interest of both newcomers and those already familiar with the peaks of the golden age.

The game comes on a double sided disk with the player having the option of either being able to print out more or to have pictures and maps. I'd have to recommend all those using the graphics (which are on disk "B") of the disk at first since there are more of them, and they are considerably more detailed, than in the original version. The music, also deserves special mention. It is very easy for background music to become very irritating during an adventure, but I must admit my sample seems to find the music composer of the *Hobbit* "Sweet", too, including a remarkably Tolkien-esque variety of atmospheric scenes. This complements the game very nicely.



The disk version contains more plot descriptions as well as the typed up graphics and narrative given comprehensive screen facilities. Those who like me, have played the game for nearly two years and then have looked the whereabouts of several of the characters 'Hobbit' expects the *Troll* showing, the two dragons, the gold bullseyes and will be a great find!

Barbara Conway's adventure advice is available for the truly frustrated. Send your Correspondence 64 volume problems to Tower of Adventure, Correspondence Horizons, 12-13 Little Newport Street, London WC2E 8PP.



Paging on the 64

Adrian Warman tinkers with 64 Basic and explains memory map manipulation

ONE OF THE FIRST selling-points encountered by the prospective buyer of the Commodore 64 Computer is the fact that it has 64k of RAM. However, only about 58k of this is given to the user when the machine is first switched on, a fact which tends to be greatly ignored. Nevertheless, an insider at the Commodore Reference Guide will be aware it is possible to make the full 64k of RAM available to the User, although the means by which this is achieved are not described in the Guide. Furthermore, the trade-offs necessary to gain the full 64k are hardly described at all.

Paging

The article has two aims. The first is to show how memory map manipulation (or paging) is achieved on the C64 64, and give details about what can and cannot be done as a result. The second aim is to show why, in the paging scheme, a memory map is to be used instead of a hardwired logic device to 'link' with Basic. Details will also be given as to the process of experimentation for those people in fairly advanced levels of programming who are content to experiment further.

If you want to take apart a C64 64 computer, you would find a number of 'chips' that perform a variety of tasks such as performing sound in pictures and so on, and the actual inputs/outputs stuff. If you start doing a few alterations with the help of the Reference Guide, you could find that they amount to more than 58k of memory locations (not needed by the system). How can this fit into a 64k machine? The device is that the disjunctive have 'overlapped' certain memory areas into 'pages'. For example, in memory locations \$A000 to \$BFFF software there exists both 8k of (effectively) usable RAM and the very important 8k of BASIC ROM without which you could not start to program! Naturally, these two areas are not 'alone' in the state that

When the machine is first switched on, the choice is automatically made to make the Basic ROM active. The RAM is deactivated and is said to exist 'behind

the Basic ROM' — it is still present, but obscured by the BASIC ROM. The choice of which area is active is made by just changing the \$110 input/output port at locations \$0000 and \$0001. After this, the value in the data register at location \$0001 enables a selection of which areas are present in a variety of memory locations. It may be advisable to refer to the Programming Reference Guide at this point.

When \$110 of the I/O data register is set to 0, location \$A000 to \$BFFF will contain the Basic ROM code. Alternatively, if the bit is set to 1, these locations will contain normal RAM.

Only bits 0 and 1 of the I/O data register affect the paging of memory, in that, although for 2 controls whether the Character Set pointers (and in the memory — but since this is non-persistent program code, it will be overwritten) between these two, they do provide a set of control over locations, for achieving the various active pages. The effects of the various active locations may be summarised in the following table:

Value of Bit 1	Value of Bit 0	Effect
1	0	Normal System operation. BASIC and Kernel ROMs are enabled, so are the I/O devices.
1	0	Kernel ROMs and I/O devices are available, but BASIC ROMs have been 'switched-on'. Any attempt to run any type of BASIC command while the code in these ROMs is not active would result in a crash.
0	1	A surprise here. Both the Kernel ROMs and the BASIC ROMs are switched-on. The I/O devices will still function, but a lot of work must be done to enable the computer to operate in a coherent fashion, since now there are no responses to handle interrupts, or to read a character, or even simply decoder keypresses.
0	0	This is a most interesting option for the rest of the article. When both bits are reset to zero, every page of ROM code is removed from memory. There are no ROMs, or I/O devices. What you are left with is a complete 64k of RAM, the process that is slightly confusing. As mentioned above, for \$500 chips was locations \$0000 and \$0001 for the I/O register, so in fact you have 64k, less 2 bytes of User RAM.

So where does this leave the average C64 64 User? Well, we now have a new variety of ways to produce some random and often spectacular crashes simply by POKE-ing into location \$0001. But that is itself is of limited interest. The fun begins when you realise that it is possible to copy the data from the ROMs directly into the RAM behind them (assuming, of course, that the ROMs are currently selected into the data bus, they are essential if a set of ROMs would not produce a crash because we are left with a machine running under a 'bare' language and Operating System.

Boot-strip

What is a 'bare language? More importantly, what mechanism can there? A good general example of such a machine would be the 'static' CP/M machine. It has a very small ROM (about 8k) more than a primitive machine (only memory locations which is machine-specific) that direct as soon as the machine is first switched on for the first time. The effect of

the results in changing the operating system or language on machines with programs that access the content. Only one of the features of the computer, then, loaded the programs is essential.

This procedure is often repeated on production shipping, and is now quickly for sure that to use a different language can operations stored on the computer, the User simply turn up the "Boots," using a different program on the appropriate Disk. This is obviously a lot cheaper than having a new computer! It should now be apparent that a "hot" language resides in the RAM of a given machine.

The advantages of loading a complete language and operating system in RAM rather than ROM should be readily apparent. If the code is in RAM, it can be stored. So how do we achieve that state of affairs on the Atari 400/500? Simply by running the following program:

```
100 FOR % = 40960 TO 49151
110 POKE %,"PROM"
120 NEXT %
130 FOR % = 17944 TO 49151
140 POKE %,"PROM"
150 NEXT %
160 POKE 17936,171 AND 255
```

This program takes about one and a half minutes to run and has no apparent effect. However, when the program is finished the Basic and Operating System on Atari 400/500 have been rewritten, and the computer is now running on user programs which reside entirely in RAM. A quick analysis of the above program would be revealing.

Lines 100-120: These lines copy the data in the BASIC ROM into RAM. Whenever a POKE is made into the memory, from 40960 to 49151, whatever the value stored affects the characters at that address. (Outside example: if the RAM was zero, that the value would simply be the current contents of the memory location which could then be altered.)

Conversely, if the ROMs were active, then the value value would always be retained, just as you would expect. However, a POKE into drive locations will always put the data into the RAM, regardless of whether the RAM is active or not. This explains the program line 110, which takes each byte of the BASIC ROM in turn, and stores a zero of 0 in the corresponding RAM location.

Lines 130-150: These lines perform a very similar task to those on 100 to 120, the difference being that this time it is the kernel ROM that is being copied into RAM, rather than the BASIC ROMs.

Line 160: This line transfers from the ROM to the RAM.

Why is no other variable used? The program is run? It is because in the code, the user programs, the command structure, nothing happened. It is all running the same code for the BASIC and Operating

System — and the fact that the data for these programs is now coming from RAM instead of ROM is a completely irrelevant. It should be noted that at any time, if you wish to restore the previous ROMs, simply perform a warm start (RUN STOP ENTER). This will restore the ROMs back into position.

The second aim of this article is to wander through the depths of the ROM code, to find the answers for the first of this article, that the ROMs have been copied into RAM by the above program. It may be advisable when first experimenting to start away with each address location in performing a warm start (as described above) and then to running the user program. This will prevent any confusion from the cumulative effects of the following. Later on, as you gain more confidence in running the code, you can then change it to suit.

The memory of the code is now referred to the Basic code, since this is the main area between User and Machine, and so any changes are most obvious in effect. However, we can start by first looking at some features in the kernel ROM, and to get the idea.

Cursor

First of these is the cursor control speed. Many readers will have observed that the Programmers Reference Guide mentions the system location "Cursor" at 50240 and "Delay" at 50250, which apparently control (or perhaps control the speed and the delay before report occurs. If you have noticed these, you probably used POKEing them to get what effect they had, and were then disappointed to see that nothing changed. The reason is that these locations are not connected to anything else. The system does not connect in order to actually change the delay and speed of report, it is necessary to alter the other values of these controls. These were previously stored in the kernel ROM, but now that the data is copied into RAM, we can get at them! Try the following two routines, then you know you can do the user programs.

POKE 50240

This location controls the report speed of the cursor. The default value of 5 is 4 if you make a 1 instead, the cursor will move more quickly, and making a larger will make it move more slowly. Simply **POKE 50240**.

is the location which controls the delay before the cursor begins to report. The default value of 5 is 10. Making a 1 smaller will cause the cursor to report

sooner and so make, making a 10 will produce a longer delay before the report starts.

There are a number of other addresses of code in the kernel program which are not mentioned in the reference manual, which address the clock and the keyboard. However, dealing with these is a more complicated procedure, and so we will not discuss them, pending a guide to address the complexity of the Operating System and its peripheral hardware. We will now consider the more basic development of the BASIC ROMs, where there is plenty to interest the average "hacker".

As mentioned above, the Basic ROMs form the main interface between User and machine. As a result, it is here that we find the stored data for BASIC keywords, system messages and prompts, and the memory of the system that we take for granted.

One of the more common questions asked by Commodore owners is how the "Y" prompt for INPUT can be altered. There are a variety of ways — one of which the INPUT itself takes values from the keyboard, which has the advantage that no prompt is needed unless you press one yourself. Another way that appears in the article is to physically change the prompt variable. The "Y" character is stored in location 16384 as an ASCII character. Here are the default numbers are 63. Only we have run the above user program we can make any value we like, and the location will still change the prompt. For example **POKE 16384**.

will change the input prompt into a "Y". Rather an irritating value to use as it will appear as if no prompt is present, but as that this value is the "forward" character and so pressing the type will show up as "forward", which is a good way of highlighting User responses to questions from the computer. If you want to prevent any prompts, simply use the value 0.

Errors

As with most things, making this simple change does have side effects. The "Y" character is not used as any key upon pressing it is also used as the "Y" character in error messages. Remember the infamous "SYNTAX ERROR" in some cases User get to used to seeing errors that they can look at the "Y" at the beginning. When making such BASIC, it is important to watch out for things like this as otherwise you could find the same very odd effect. I said

However, in this case the only effect is one shown. You can either prevent the effect by pressing the "Y" character when you have finished your input or the you can use one of the various characters if you get the value to be 10 which is the reverse



on this matter, then not only will any input characters be in "ready", but so will some messages!

There are a surprising number of ASCII sequences in the BASIC ROMs which fall into this category. As well as all the BASIC keywords, there are the three messages and various System prompts. There are two formats in which these messages are stored, and we will now look at them both with the help of some interesting examples.

The first type of sequence are those of standard ASCII characters, with the message terminated by an ASCII NULL character number 0. One such message (and a very important one!) is "READY", which is stored in location \$A7FA (\$A7F0 to \$A7F5 inclusive). You can discover that this is more than the number of characters actually observed on the screen. A simple program to look at the contents of these locations would reveal the following ASCII code:

```
(R1) LDF R,E,A,D,Y (R6) STP (RUL)
```

and note that because there are ASCII symbols, (R1) means: Character Return and (R6) means: Line Feed. When the computer decides that it is time to print the "READY" message, it accesses the short code and prints each character until the NULL is encountered. On the Commodore computer, when printing to the screen, the (R1) symbol moves the cursor down to the start of the next line (and only if necessary), and the (R6) symbol has no effect.

We shall now change the sequence slightly so that a ready-on prompt is produced. When the user program has been run by the following program:

```
100 FOR X=41234 TO 41235
110 READY
120 POKE X,Y
130 NEXT Y
140 DATA 17,18,62,12,00,00,00,00
150 GO TO 10
```

I will put up to you what the program does (simply that the effect is a systematic deletion from the saved C memory prompt, so you must try it for yourself).

There are several other messages using this format. Locations \$A83C-\$A84D (\$A834 to \$A83F) contain for the first four messages "ENTERA", "GOTOEND" and "READY FROM START". These particular messages are especially interesting for two reasons. Firstly, they are not fatal which means that program execution will continue even though an error has occurred, and secondly, the "Y" character at the start of these four messages is not the same as the prompt that we were showing above. Hence any tinkering with location \$A834 will not affect these messages.

The second (and most common) format for messages is different merely in the way that the end of the message is determined. In the previous format, a message was terminated by the ASCII NULL character. The second format indicates termination by setting bit 7 of the last character to a '1'. For example in the \$A87A's error code characters the code are stored as follows:

S	R	P	T	A	N	
12	18	4E	54	40	04	
13	09	71	66	42	14	

(Note value to show bit 7)
(Decimal value)

This format is by far the most important because it is the format used for storing all the BASIC keywords. The next section of the article will now consider how we can actually manipulate BASIC keywords themselves.

There are a large number of BASIC keywords and Operators, and to give a full description of their use (and how to alter them) is beyond the scope of this article. However, we will discuss a table of their structure and look at the way in which some of the single modification can be applied. It is, I think, better to illustrate it

data for more BASIC statements (although functions and operators are not included, the principles are similar) and show the keyword, the position of its use together with the normal value of an action vector, and the position of the vector. To find how the table works, we shall perform a simple change that may be of interest to those who like tinkering with generating programs.

For this example, we shall start the LIST keyword to perform an entirely different task, namely to act as a ROM. We could of course choose a destructive system such as making LIST perform a NIM, or even to make some of our own machine code for (say) a video synthesizer card!

We can see that the vector for REM is stored at \$A87A (\$A870), and has the value \$A7FA (\$A012). Similarly, the vector for LIST is stored at \$A842 (\$A000). All we have to do is order to make LIST act as a ROM is to alter the LIST vector to point to the REM routine. This is done by the following program:

```
100 POKE 41234 41232:INT 40722/256*256
110 POKE 4127 INT 40722/256
```

Having done this, any attempt to perform a

"LIST" will behave as if REM had been entered instead of LIST!

Simply speaking, the action vector for each of the keywords does not give the start address of the appropriate routine, but is a first very tentative hint. The reason is to do with the way in which the BASIC operators, but more the word operators, in all the action vectors we can explore it.

But what if we were faced with having to enter LIST in order to display any hint within a program? It is possible to enter the keyword table in BASIC so that we could make an alternative word of any length that we liked, but this is more complicated, and so we will here assume that we cannot use more characters for a keyword than are already present in the default word. Thus, instead of LIST we could have "TRIP" or "SHOG". For this example, we will enter the name "SHOG". To replace LIST with the word "SHOG", we use the following program:

```
100 FOR X=41232 TO 41235
110 READY
120 POKE X,Y
130 NEXT Y
140 DATA 17,18,62,12
```

From this point on, any attempt to use LIST will produce a syntax error. Instead, you must use the new keyword, "SHOG".

Just as you would expect, in the same way as you can use "L" "SHIFT" as an abbreviation for LIST, so when you have altered the keyword to "SHOG", you can now use "S" "SHIFT" as an alternate name.

I hope that this discussion into the inner depths of the System ROM's will show that even those accused to machine code programming are at last "play around" with the system in such a way as to be acceptable without being to define! ■

BASIC Keyword Table

Keyword	Address	Address	Address	Address	Address
END	\$A83C	\$A83C	\$A83C	\$A83C	\$A83C
FOR	\$A83D	\$A83D	\$A83D	\$A83D	\$A83D
NEXT	\$A83E	\$A83E	\$A83E	\$A83E	\$A83E
DATA	\$A83F	\$A83F	\$A83F	\$A83F	\$A83F
PRINT	\$A840	\$A840	\$A840	\$A840	\$A840
INPUT	\$A841	\$A841	\$A841	\$A841	\$A841
IF	\$A842	\$A842	\$A842	\$A842	\$A842
THEN	\$A843	\$A843	\$A843	\$A843	\$A843
ELSE	\$A844	\$A844	\$A844	\$A844	\$A844
DO	\$A845	\$A845	\$A845	\$A845	\$A845
UNTIL	\$A846	\$A846	\$A846	\$A846	\$A846
WHILE	\$A847	\$A847	\$A847	\$A847	\$A847
WEND	\$A848	\$A848	\$A848	\$A848	\$A848
FOR	\$A849	\$A849	\$A849	\$A849	\$A849
NEXT	\$A84A	\$A84A	\$A84A	\$A84A	\$A84A
DATA	\$A84B	\$A84B	\$A84B	\$A84B	\$A84B
PRINT	\$A84C	\$A84C	\$A84C	\$A84C	\$A84C
INPUT	\$A84D	\$A84D	\$A84D	\$A84D	\$A84D
IF	\$A84E	\$A84E	\$A84E	\$A84E	\$A84E
THEN	\$A84F	\$A84F	\$A84F	\$A84F	\$A84F
ELSE	\$A850	\$A850	\$A850	\$A850	\$A850
DO	\$A851	\$A851	\$A851	\$A851	\$A851
UNTIL	\$A852	\$A852	\$A852	\$A852	\$A852
WHILE	\$A853	\$A853	\$A853	\$A853	\$A853
WEND	\$A854	\$A854	\$A854	\$A854	\$A854
FOR	\$A855	\$A855	\$A855	\$A855	\$A855
NEXT	\$A856	\$A856	\$A856	\$A856	\$A856
DATA	\$A857	\$A857	\$A857	\$A857	\$A857
PRINT	\$A858	\$A858	\$A858	\$A858	\$A858
INPUT	\$A859	\$A859	\$A859	\$A859	\$A859
IF	\$A85A	\$A85A	\$A85A	\$A85A	\$A85A
THEN	\$A85B	\$A85B	\$A85B	\$A85B	\$A85B
ELSE	\$A85C	\$A85C	\$A85C	\$A85C	\$A85C
DO	\$A85D	\$A85D	\$A85D	\$A85D	\$A85D
UNTIL	\$A85E	\$A85E	\$A85E	\$A85E	\$A85E
WHILE	\$A85F	\$A85F	\$A85F	\$A85F	\$A85F
WEND	\$A860	\$A860	\$A860	\$A860	\$A860
FOR	\$A861	\$A861	\$A861	\$A861	\$A861
NEXT	\$A862	\$A862	\$A862	\$A862	\$A862
DATA	\$A863	\$A863	\$A863	\$A863	\$A863
PRINT	\$A864	\$A864	\$A864	\$A864	\$A864
INPUT	\$A865	\$A865	\$A865	\$A865	\$A865
IF	\$A866	\$A866	\$A866	\$A866	\$A866
THEN	\$A867	\$A867	\$A867	\$A867	\$A867
ELSE	\$A868	\$A868	\$A868	\$A868	\$A868
DO	\$A869	\$A869	\$A869	\$A869	\$A869
UNTIL	\$A86A	\$A86A	\$A86A	\$A86A	\$A86A
WHILE	\$A86B	\$A86B	\$A86B	\$A86B	\$A86B
WEND	\$A86C	\$A86C	\$A86C	\$A86C	\$A86C
FOR	\$A86D	\$A86D	\$A86D	\$A86D	\$A86D
NEXT	\$A86E	\$A86E	\$A86E	\$A86E	\$A86E
DATA	\$A86F	\$A86F	\$A86F	\$A86F	\$A86F
PRINT	\$A870	\$A870	\$A870	\$A870	\$A870
INPUT	\$A871	\$A871	\$A871	\$A871	\$A871
IF	\$A872	\$A872	\$A872	\$A872	\$A872
THEN	\$A873	\$A873	\$A873	\$A873	\$A873
ELSE	\$A874	\$A874	\$A874	\$A874	\$A874
DO	\$A875	\$A875	\$A875	\$A875	\$A875
UNTIL	\$A876	\$A876	\$A876	\$A876	\$A876
WHILE	\$A877	\$A877	\$A877	\$A877	\$A877
WEND	\$A878	\$A878	\$A878	\$A878	\$A878
FOR	\$A879	\$A879	\$A879	\$A879	\$A879
NEXT	\$A87A	\$A87A	\$A87A	\$A87A	\$A87A
DATA	\$A87B	\$A87B	\$A87B	\$A87B	\$A87B
PRINT	\$A87C	\$A87C	\$A87C	\$A87C	\$A87C
INPUT	\$A87D	\$A87D	\$A87D	\$A87D	\$A87D
IF	\$A87E	\$A87E	\$A87E	\$A87E	\$A87E
THEN	\$A87F	\$A87F	\$A87F	\$A87F	\$A87F
ELSE	\$A880	\$A880	\$A880	\$A880	\$A880
DO	\$A881	\$A881	\$A881	\$A881	\$A881
UNTIL	\$A882	\$A882	\$A882	\$A882	\$A882
WHILE	\$A883	\$A883	\$A883	\$A883	\$A883
WEND	\$A884	\$A884	\$A884	\$A884	\$A884
FOR	\$A885	\$A885	\$A885	\$A885	\$A885
NEXT	\$A886	\$A886	\$A886	\$A886	\$A886
DATA	\$A887	\$A887	\$A887	\$A887	\$A887
PRINT	\$A888	\$A888	\$A888	\$A888	\$A888
INPUT	\$A889	\$A889	\$A889	\$A889	\$A889
IF	\$A88A	\$A88A	\$A88A	\$A88A	\$A88A
THEN	\$A88B	\$A88B	\$A88B	\$A88B	\$A88B
ELSE	\$A88C	\$A88C	\$A88C	\$A88C	\$A88C
DO	\$A88D	\$A88D	\$A88D	\$A88D	\$A88D
UNTIL	\$A88E	\$A88E	\$A88E	\$A88E	\$A88E
WHILE	\$A88F	\$A88F	\$A88F	\$A88F	\$A88F
WEND	\$A890	\$A890	\$A890	\$A890	\$A890
FOR	\$A891	\$A891	\$A891	\$A891	\$A891
NEXT	\$A892	\$A892	\$A892	\$A892	\$A892
DATA	\$A893	\$A893	\$A893	\$A893	\$A893
PRINT	\$A894	\$A894	\$A894	\$A894	\$A894
INPUT	\$A895	\$A895	\$A895	\$A895	\$A895
IF	\$A896	\$A896	\$A896	\$A896	\$A896
THEN	\$A897	\$A897	\$A897	\$A897	\$A897
ELSE	\$A898	\$A898	\$A898	\$A898	\$A898
DO	\$A899	\$A899	\$A899	\$A899	\$A899
UNTIL	\$A89A	\$A89A	\$A89A	\$A89A	\$A89A
WHILE	\$A89B	\$A89B	\$A89B	\$A89B	\$A89B
WEND	\$A89C	\$A89C	\$A89C	\$A89C	\$A89C
FOR	\$A89D	\$A89D	\$A89D	\$A89D	\$A89D
NEXT	\$A89E	\$A89E	\$A89E	\$A89E	\$A89E
DATA	\$A89F	\$A89F	\$A89F	\$A89F	\$A89F
PRINT	\$A8A0	\$A8A0	\$A8A0	\$A8A0	\$A8A0
INPUT	\$A8A1	\$A8A1	\$A8A1	\$A8A1	\$A8A1
IF	\$A8A2	\$A8A2	\$A8A2	\$A8A2	\$A8A2
THEN	\$A8A3	\$A8A3	\$A8A3	\$A8A3	\$A8A3
ELSE	\$A8A4	\$A8A4	\$A8A4	\$A8A4	\$A8A4
DO	\$A8A5	\$A8A5	\$A8A5	\$A8A5	\$A8A5
UNTIL	\$A8A6	\$A8A6	\$A8A6	\$A8A6	\$A8A6
WHILE	\$A8A7	\$A8A7	\$A8A7	\$A8A7	\$A8A7
WEND	\$A8A8	\$A8A8	\$A8A8	\$A8A8	\$A8A8
FOR	\$A8A9	\$A8A9	\$A8A9	\$A8A9	\$A8A9
NEXT	\$A8AA	\$A8AA	\$A8AA	\$A8AA	\$A8AA
DATA	\$A8AB	\$A8AB	\$A8AB	\$A8AB	\$A8AB
PRINT	\$A8AC	\$A8AC	\$A8AC	\$A8AC	\$A8AC
INPUT	\$A8AD	\$A8AD	\$A8AD	\$A8AD	\$A8AD
IF	\$A8AE	\$A8AE	\$A8AE	\$A8AE	\$A8AE
THEN	\$A8AF	\$A8AF	\$A8AF	\$A8AF	\$A8AF
ELSE	\$A8B0	\$A8B0	\$A8B0	\$A8B0	\$A8B0
DO	\$A8B1	\$A8B1	\$A8B1	\$A8B1	\$A8B1
UNTIL	\$A8B2	\$A8B2	\$A8B2	\$A8B2	\$A8B2
WHILE	\$A8B3	\$A8B3	\$A8B3	\$A8B3	\$A8B3
WEND	\$A8B4	\$A8B4	\$A8B4	\$A8B4	\$A8B4
FOR	\$A8B5	\$A8B5	\$A8B5	\$A8B5	\$A8B5
NEXT	\$A8B6	\$A8B6	\$A8B6	\$A8B6	\$A8B6
DATA	\$A8B7	\$A8B7	\$A8B7	\$A8B7	\$A8B7
PRINT	\$A8B8	\$A8B8	\$A8B8	\$A8B8	\$A8B8
INPUT	\$A8B9	\$A8B9	\$A8B9	\$A8B9	\$A8B9
IF	\$A8BA	\$A8BA	\$A8BA	\$A8BA	\$A8BA
THEN	\$A8BB	\$A8BB	\$A8BB	\$A8BB	\$A8BB
ELSE	\$A8BC	\$A8BC	\$A8BC	\$A8BC	\$A8BC
DO	\$A8BD	\$A8BD	\$A8BD	\$A8BD	\$A8BD
UNTIL	\$A8BE	\$A8BE	\$A8BE	\$A8BE	\$A8BE
WHILE	\$A8BF	\$A8BF	\$A8BF	\$A8BF	\$A8BF
WEND	\$A8C0	\$A8C0	\$A8C0	\$A8C0	\$A8C0
FOR	\$A8C1	\$A8C1	\$A8C1	\$A8C1	\$A8C1
NEXT	\$A8C2	\$A8C2	\$A8C2	\$A8C2	\$A8C2
DATA	\$A8C3	\$A8C3	\$A8C3	\$A8C3	\$A8C3
PRINT	\$A8C4	\$A8C4	\$A8C4	\$A8C4	\$A8C4
INPUT	\$A8C5	\$A8C5	\$A8C5	\$A8C5	\$A8C5
IF	\$A8C6	\$A8C6	\$A8C6	\$A8C6	\$A8C6
THEN	\$A8C7	\$A8C7	\$A8C7	\$A8C7	\$A8C7
ELSE	\$A8C8	\$A8C8	\$A8C8	\$A8C8	\$A8C8
DO	\$A8C9	\$A8C9	\$A8C9	\$A8C9	\$A8C9
UNTIL	\$A8CA	\$A8CA	\$A8CA	\$A8CA	\$A8CA
WHILE	\$A8CB	\$A8CB	\$A8CB	\$A8CB	\$A8CB
WEND	\$A8CC	\$A8CC	\$A8CC	\$A8CC	\$A8CC
FOR	\$A8CD	\$A8CD	\$A8CD	\$A8CD	\$A8CD
NEXT	\$A8CE	\$A8CE	\$A8CE	\$A8CE	\$A8CE
DATA	\$A8CF	\$A8CF	\$A8CF	\$A8CF	\$A8CF
PRINT	\$A8D0	\$A8D0	\$A8D0	\$A8D0	\$A8D0
INPUT	\$A8D1	\$A8D1	\$A8D1	\$A8D1	\$A8D1
IF	\$A8D2	\$A8D2	\$A8D2	\$A8D2	\$A8D2
THEN	\$A8D3	\$A8D3	\$A8D3	\$A8D3	\$A8D3
ELSE	\$A8D4	\$A8D4	\$A8D4	\$A8D4	\$A8D4
DO	\$A8D5	\$A8D5	\$A8D5	\$A8D5	\$A8D5
UNTIL	\$A8D6	\$A8D6	\$A8D6	\$A8D6	\$A8D6
WHILE	\$A8D7	\$A8D7	\$A8D7	\$A8D7	\$A8D7
WEND	\$A8D8	\$A8D8	\$A8D8	\$A8D8	\$A8D8
FOR	\$A8D9	\$A8D9	\$A8D9	\$A8D9	\$A8D9
NEXT	\$A8DA	\$A8DA	\$A8DA	\$A8DA	\$A8DA
DATA	\$A8DB	\$A8DB	\$A8DB	\$A8DB	\$A8DB
PRINT	\$A8DC	\$A8DC	\$A8DC	\$A8DC	\$A8DC
INPUT	\$A8DD	\$A8DD	\$A8DD	\$A8DD	\$A8DD
IF	\$A8DE	\$A8DE	\$A8DE	\$A8DE	\$A8DE
THEN	\$A8DF	\$A8DF	\$A8DF	\$A8DF	\$A8DF
ELSE	\$A8E0	\$A8E0	\$A8E0	\$A8E0	\$A8E0
DO	\$A8E1	\$A8E1	\$A8E1	\$A8E1	\$A8E1
UNTIL	\$A8E2	\$A8E2	\$A8E2	\$A8E2	\$A8E2
WHILE	\$A8E3	\$A8E3	\$A8E3	\$A8E3	\$A8E3
WEND	\$A8E4	\$A8E4	\$A8E4	\$A8E4	\$A8E4
FOR	\$A8E5	\$A8E5	\$A8E5	\$A8E5	\$A8E5
NEXT	\$A8E6	\$A8E6	\$A8E6	\$A8E6	\$A8E6
DATA	\$A8E7	\$A8E7	\$A8E7	\$A8E7	\$A8E7
PRINT	\$A8E8	\$A8E8	\$A8E8	\$A8E8	\$A8E8

PC compatible?

What is the PC standard? Why is IBM's PC so important? And how does the Commodore PC compare on price and features? Trevor Deharty answers the questions and finds out what the PC can offer you

COMMODORE have taken what for them is a unique step: they have introduced a machine which is compatible with someone else's standards. In this case the standards set at IBM, and that is now the industry standard? Not personal computers. To understand the importance of this, you need to look at what has happened to the business personal computer market over the last three years.

Bewildering

Before IBM introduced their PC it began to be available in the UK in 1982, there were many more, mostly 8-bit business machines on the market, with a bewildering variety of standards, including Commodore's own PET series, the early Apple models and a whole clutch of other machines which operated under CP/M, the first real standard operating system for microcomputers. In the UK, Commodore machines were probably the biggest sellers, indeed Commodore estimate there are still some 120,000 in use today. Whilst the CP/M operating system did offer a standard, there was still a wide variety of different machines making it difficult for

software to run on more than one make of machine. All this changed when the success IBM Corporation decided to enter the Personal Computer market.

Looking at the situation in 1984, the UK scene is a whole lot simpler. There are the 16-bit IBM and IBM compatible machines taking the lion's share of the market (particularly in the Corporate sector), and then there is Apple, still selling some 8-bit Apple II's, plus the revolutionary 32-bit Macintosh. Everything else is really small beer.

So what is the IBM standard? Well, at the very least it is the ability to run the MS-DOS operating system, usually using a 16-bit Intel 8086 or 8088 processor chip. Potentially it also includes hardware contractual compatibility so that standard, used additional options, could branch for 'extra's to be added to extend the machine. For example to add additional communication facilities. The degree of compatibility varies enormously. The main effect of this standard has been the creation of an enormous amount of software. Shortly but not exclusively, business software which will run on these machines. I counted over 300 packages listed in one of the operator magazines. The range of software available is simply unmatched and thereby has the basis of the standard.

Some critics what has happened saying the IBM standard is not state of the art, that it is stifling hardware development, but the market stability it has provided overrides all that, as my new Success leads:

to software availability and software availability has no reason to doubt Apple to track into for its own machine. In its own way the 86 is at a rather unique position in the home machine market, thus the standard range of software for the 86. The attempt to establish a new standard for home machines, MSX, doesn't seem to have met with much success.

One recent development in the States is that the IBM standard is starting to have an impact on the home market, as people trade up from their Apple II's. The trend is definitely towards more serious home computing, as people get tired with 8-bit games, and that enormous stock of IBM compatible software just cannot be ignored. The upgrade doesn't come cheap, a Commodore PC is around four times the price of a 86 with disk drive and most expensive monitor. Still, the American home computer buyers are better able to afford PC's than the UK users.

Loyalty

What about the Commodore PC? Well it makes its impact on the IBM compatible market, to well it just is. Another IBM compatible? Only time will tell, but some factors are worth considering. One the machine is extremely compatible, both hard and software wise. (I'll test I wish they hadn't been quite so strict when copying the keyboard which provides the great IBM custom key arrangement on the screen, keyboard - terrible to use with spreadsheet programs.) I took an IBM version of the Visiwriter word processor to the launch and it booted straight up and ran perfectly. Commodore don't claim 100% compatibility with all software but indications are that Commodore PC is one of the most compatible machines available.

Secondly, the price at 1294, below the equivalent IBM, places it very close to the cheapest fully IBM compatible in the UK market.

Thirdly, Commodore's strength in the business computer market in the UK, with the PET series could give them sufficient brand loyalty to give them a helpful boost in market share. However, by the time you read this IBM may have announced the strongly rumored PCII with a faster processor, 3 1/2 inch disk drive, and probably 20% cheaper than the original PC.

Commodore's PC - could it be a market leader?





SPECIFICATION

■ CPU

8088 Processor
8087 Co-processor (optional)
4.77 MHz clock rate

■ Memory

At least 640K size
256K, 512K standard
Internally expandable to 1MB
Externally expandable using full length expansion boards to 640K
640K max
Standard BIOS

■ Display

12" CRT (non glass phosphor) (optional)
640x480 medium resolution RGB colour monitor (available shortly after launch)

Alphanumeric, 80x25 char resolution 6x14
80x25 character display
Colour and 80-Run graphics are not in the standard configuration at launch

■ Storage

Dual 300K bytes, 5 1/4" double density,
double sided disk drives (PC, XT)
Format IBM compatible 40 tracks,
9 sectors/track.
ST

Single 300K bytes, 5 1/4" disk drive
plus 10M bytes hard disk

■ External Storage

The standard floppy disk controller is able
to handle up to 4 drives
Controller is capable of supporting two
 Winchester disks with a capacity of up to
768K bytes per drive

■ Expansion

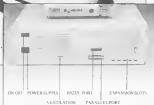
5 full sized PC compatible expansion
slots

■ Keyboard

Detachable keyboard
27 keys including 10 function keys and
numers, keypad
Meets European CEV requirements

■ Interface

Parallel Printer port (Optional)
RS232C port
Monochrome video output
Composite B/W video output (not in the
standard configuration at launch)



■ Operating System

MS-DOS

■ Language

IBM Basic
Optional programming languages: Cobol,
Fortran, Pascal, Macro Assembler etc.

■ Physical Specifications

Base Unit (K, PL)	86 94 x 415
with 48mm	depth 190mm
Monitor	86 27 30cm
width 30 3cm	depth 28 3cm
Keyboard	86 4 8cm
width 44cm	depth 17cm

■ Power Supply

1.0A, 240 V AC 170 watts 50Hz
Optional 240 V AC, 20 watts 50Hz

■ Price

£2 675 for the dual floppy disk version
the PC/XT
£2 795 for the dual floppy disk version
the XT/20

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COMMODORE PC (256KB RAM)

SPECIFICATION

Computing	IBM PC & XT
Microprocessor	Intel 80486 16 bit processor Intel 80487 floating Pt ar Processor 5000 clock
Clock Speed	4.77 MHz
Memory	Max 128KB RAM (expandable to 640KB) 128KB 256 KB RAM RAM 512 or 1MB
Display	12" monochrome CRT (green phosphor) Screen: 640x480 Monochrome alphanumeric: 80 x 25 Monochrome graphics: 640 x 200 pixels Monochrome graphics: 640 x 200 pixels Alphanumeric, no display High contrast to enable no video. Making Available to transcode 8001
Keyboard	Optional 80 keys including 16 function keys
Interface	Parallel port - Comports Keyboard Serial port - RS232C PC/XT Comports de monochrome Full expansion slots (up to 16) compatible PC/XT Power
Storage	Dual floppy & dual floppy disk drives up to 10MB 5.25 or One floppy & one 10 MB hard disk
Operating system	IBM DOS
Language	C/C++ Basic

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TWEED PROGRAM for the unexpanded
for 286 runs from Michael Turner of
Buxley Hill, Wym Mole

MUSIC BOX is a sound synthesizer for the
Vix 286. It turns just five notes & signs,
keyboard with a 100 note memory. When
you run the program you are asked which
notes you require. 1 to 5, 4 is what note.
You then input the length of the notes you
wish to play, the shortest possible being 1
and the longest 999.

Play your notes using all the keys except
0-9 using M or Y to insert pauses. When
you're finished press F7, select a playback
note, and after an interval of a couple of
seconds your tune will play back. Press
space to insert pauses in playback, and
press 0 to return to the beginning of the
program.

```

0 REM*****
1 REM**MUSIC MH 04**
2 REM*****P*****
3 REM*****TUNING**
4 REM*****
5 CLR DIMD:100
7 FOR E=0 TO 9
8 PRINT "E"
9 PRINT " "
10 PRINT "000*****"
11 PRINT "MH MUSIC MH 04 "
12 PRINT "MH BY H. TURNER "
13 PRINT "*****"
14 PRINT "*****"
15 PRINT "MH WHICH VOICE 1-4 "
16 PRINT "*****"
17 INPUT
18 IF 1:GOTO 17
20 F=INT(RND*65537)
25 FOR E=0 TO 15
30 DIM D(100)
35 PRINT "DURATION OF NOTE/NOTE"
36 INPUT D
40 IF D(1) > 0:GOTO 45
45 REM IF D(1) > 0 THEN GOTO 45
50 REM D(1)
55 GOTO 45
60 GET H:IF H=" " THEN GOTO 60
65 IF H="0" THEN H=0
70 IF H="1" THEN H=1
75 IF H="2" THEN H=2
80 IF H="3" THEN H=3
85 IF H="4" THEN H=4
90 FOR D=1 TO 100
95 FOR E=0 TO 15
100 FOR D=1 TO 100
105 IF D(1) > 0 THEN GOTO 105
110 GOTO 60
115 FOR D=0 TO 100
120 DATA 1,135,87,143,69,147,82,151,84,159,69,163,85,167,73,175
125 DATA 79,207,71,209,72,212,74,215,75,217,76,219,50,221
130 DATA 59,223,61,225,17,227,39,228,65,229,47,231,66,232,66,233
140 DATA 79,175,77,206,44,237,45,238,47,239,17,240,29,24,8
145 PRINT "DURATION OF NOTE/NOTE"
150 FOR E=0 TO 15
155 INPUT "WHICH VOICE "
160 IF 1:GOTO 155

```




```

165 POKE36878,15
170 POKE4100V
175 POKE4150:STEP=DP:POKE36878,D:HELT:POKE36873+5,0:POKE36876,15
180 POKE36873+5,0:PF:PRINT"CF:POKE36879,0:PF:
190 HELT:PF
195 POKE4150:STEP=DP:POKE36878,D:HELT:POKE36873+5,0:POKE36876,15
200 POKE36873+5
205 PRINT"#####HELT:HELT:~"
210 PRINT"1-PLAY:TUNE?"
215 PRINT"2-PUTUP TO KEY:BURR?"
220 GETTA:IFTA=""THEN220
225 IFTA="1"THEN6070145
230 IFTA="2"THEN60100

```

Errorline

*TWIS is only run from 4th of Epoch
of Epoch 4, forward!*
ERRORLINE is a small but useful utility

which will tell you when typing in complete
brackets. When you type in a listing you're
always bound to make a mistake, with the
result that the computer comes up with
"Error in line NNN" when you run the
program. To correct the error, you must
type in the line manually. Errorline lets

you do this automatically, so that when you
run a program it's fixed with mistakes will
be found for correction.

The program resides in memory at
location 40000. It's automatically
activated, and you should use it before
first using it.

```

55000 res errorline-listar
55001 res
55002
55003
55004 res (c) a. eggi 1985
55005
55100 for i=49152 to 49238
55110 read a:nexta
55120 pokei,a
55130 next
55140
55150 if a<>88881 thenprint"error in data "":a:and
55160 sys49152
55170 print"errorline-listar activated "":
55180 res
55190
55200 data169,013,141,000,003,133,003
55210 data169,192,141,001,000,096,138
55220 data048,002,016,007,164,002,048
55230 data045,076,116,164,072,160,157
55240 data016,006,076,058,164,078,116
55250 data164,164,057,132,020,164,088
55260 data132,021,032,019,166,160,126
55270 data132,002,169,167,032,210,235
55280 data169,013,032,210,235,032,210
55290 data235,076,189,166,160,000,132
55300 data002,162,000,160,000,024,032
55310 data240,235,104,170,076,088,164
55320 data076,116,164

```

Send us your Commodore programs, enclosing a source file — and a printout on plain white paper if possible. Each
listing must be accompanied by a typeset or handwritten description describing the program and explaining how it is
constructed. We pay \$4.00 for each bug-free listing published. We cannot guarantee to return every program
submitted, so please keep a copy. If you want to be sure your listing has been received, please send a stamped, addressed
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FIRST PUBLISHING LTD

First past the post

Christina Eiskine talks to Sara Gelfrath, whose First Publishing Company intends to be number one in Commodore 64 utilities

AT JUST 34 years old, Sara Gelfrath has packed a lot into her working life — she's been a cook, a secretary, marketing assistant, and fiscal manager in various companies. Her experience has culminated in First Publishing, her own business dealing with integrated books and software.

Service, business style software for the Commodore 64 took a back seat last year, with the wave of quality games being imported under license from the States.

In last September, when US Gold and the like were just getting into their stride, Sara had just quit her job at First Publishing, and was preparing to introduce map-to-use word processors and spreadsheets, languages and terminals. While First is not winning anything competitively now or tomorrow, Sara is confident that her approach to the market is the right one.

"My main objective is to establish a reputation for quality and reliability. To build up any sort of brand reputation, First Publishing's products must be instantly recognizable, which is why we've gone for the distinctive blue and yellow packaging on both the books and the software. I want, if you like, to become the Marks and Spencer of software — a brand people can detect because they know it'll be reliable."

Specifically, the software so far comprises FirstWORD 64 — "a new single-forward word processor — it must be about the only one you can load up and use immediately without having to wade through a manual," says Sara — a data base on file First BASE 64, which she claims is "easy to use as good as Superbase," (Preston Software's flagship product), PowerPLAN, a spreadsheet. Pascal, and an assembler/monitor. Prices range from £10 to £24.95.

Venture

The books are designed to facilitate a deeper understanding of the Commodore 64, and are definitely not for the beginner. "That's different," said Sara. "I felt that there were quite enough beginners' books on the market and it was time to do something for people who were ready for the next stage."

All this is a far cry from her first job at a restaurant, said. "I was perfectly happy being a cook," she grinned. "But I gradually realised that I wasn't going to get very far if I carried on drinking or smoking."

"So I left cooking — and I finally got the time to do my own, which is a shame — and became a secretary and worked my way up from there. I wouldn't say it was an intention to run my own business though. I mean, two years ago, I would have found

what I'm doing more unattractive."

Her contact with First Publishing has been considerably helped by the support received from the German company Data Becker. So far, all First's sales have been licensed from Data Becker and translated into English. As Becker provided Sara with the original finance to set up First Publishing, I wondered if she was going to rely on Becker's product permanently.



"Oh no, the two companies are entirely separate — there's nothing in the contract to say that we have to use Becker's work."

"So far, I've done so, simply because it is very good. But I would like to deal with freelance programmers in this country in the next year or so."

"I'm very concerned that the company should become fully stable and established — I planned to be around for a long time. As I do have steady access to a source of excellent product, I'll say it. In two years time, though, I may well branch out and do something radical."

But why did Sara start up on her own in the first place? She was fiscal manager at Precision Software at the time, and doing well.

"I was frustrated, their resources. I wanted to be able to implement my own ideas. I had previously been at Precision Software — a company full of very able, very experienced men, who had all the capability of an ace team. I was frustrated to get set up on educational software devices, but frankly, just not enough money was put

into it.

"Then I moved to Precision, where the product was excellent, but the marketing was not. It was very easy to see what could be done, marketing wise, but impossible to get people to do it for me."

So First Publishing arose out of Sara's wish to be able to implement, unimpeded, her own ideas.

"I tried writing begging letters to ask for the start-up finance for a company, but this came to nothing. Then I met Becker in Germany and discovered our ideas were identical."

Data Becker also has links with three other companies, in France, Holland and the USA, maintaining much the same sort of relationship as with First. Data Becker protect therefore tends to reflect the popular machines as the countries concerned, which explains why so far all First products have been exclusively for the Commodore 64, with an international focus. However, that is not to change.

"We have plans to convert and rewrite for the Atari 800 and the Amiga," said Sara. "The Amiga has done very well in Germany, as well as the UK, and we have high hopes of the 800 range. One of the Data Becker people is in Münster, and has been working very closely with Atari and knows quite a bit about the range prior to launch."

It's now nine months since First Publishing began. Sara now employs seven staff, including two full-time programmers and two sales people.

"I have the sales people on the road, talking directly to the dealers all the time. That way, the dealers get to know us as well. Some distribution does go through more conventional channels, but selling directly to the shops is often more effective."

Selling

The company has already had its ups and downs though. We were three months late on the market with the first release, which was very annoying. We had hoped to bring them out in October, but they didn't appear until you believe Christmas, so we lost a lot of ground selling time.

"But sales have been good — surprisingly so, in fact. I feel that there is probably not a more devoted fan base of product yet, but I would certainly want to create one."

"What I'd really like at the moment is a partner who would share some of the responsibility. It really isn't at all easy doing it all on one's own."



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238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000, 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, 1013, 1014, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1027, 1028, 1029, 1030, 1031, 1032, 1033, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1044, 1045, 1046, 1047, 1048, 1049, 1050, 1051, 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1072, 1073, 1074, 1075, 1076, 1077, 1078, 1079, 1080, 1081, 1082, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1343, 1344, 1345, 1346, 1347, 1348, 1349, 1350, 1351, 1352, 1353, 1354, 1355, 1356, 1357, 1358, 1359, 1360, 1361, 1362, 1363, 1364, 1365, 1366, 1367, 1368, 1369, 1370, 1371, 1372, 1373, 1374, 1375, 1376, 1377, 1378, 1379, 1380, 1381, 1382, 1383, 1384, 1385, 1386, 1387, 1388, 1389, 1390, 1391, 1392, 1393, 1394, 1395, 1396, 1397, 1398, 1399, 1400, 1401, 1402, 1403, 1404, 1405, 1406, 1407, 1408, 1409, 1410, 1411, 1412, 1413, 1414, 1415, 1416, 1417, 1418, 1419, 1420, 1421, 1422, 1423, 1424, 1425, 1426, 1427, 1428, 1429, 1430, 1431, 1432, 1433, 1434, 1435, 1436, 1437, 1438, 1439, 1440, 1441, 1442, 1443, 1444, 1445, 1446, 1447, 1448, 1449, 1450, 1451, 1452, 1453, 1454, 1455, 1456, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1464, 1465, 1466, 1467, 1468, 1469, 1470, 1471, 1472, 1473, 1474, 1475, 1476, 1477, 1478, 1479, 1480, 1481, 1482, 1483, 1484, 1485, 1486, 1487, 1488, 1489, 1490, 1491, 1492, 1493, 1494, 1495, 1496, 1497, 1498, 1499, 1500, 1501, 1502, 1503, 1504, 1505, 1506, 1507, 1508, 1509, 1510, 1511, 1512, 1513, 1514, 1515, 1516, 1517, 1518, 1519, 1520, 1521, 1522, 1523, 1524, 1525, 1526, 1527, 1528, 1529, 1530, 1531, 1532, 1533, 1534, 1535, 1536, 1537, 1538, 1539, 1540, 1541, 1542, 1543, 1544, 1545, 1546, 1547, 1548, 1549, 1550, 1551, 1552, 1553, 1554, 1555, 1556, 1557, 1558, 1559, 1560, 1561, 1562, 1563, 1564, 1565, 1566, 1567, 1568, 1569, 1570, 1571, 1572, 1573, 1574, 1575, 1576, 1577, 1578, 1579, 1580, 1581, 1582, 1583, 1584, 1585, 1586, 1587, 1588, 1589, 1590, 1591, 1592, 1593, 1594, 1595, 1596, 1597, 1598, 1599, 1600, 1601, 1602, 1603, 1604, 1605, 1606, 1607, 1608, 1609, 1610, 1611, 1612, 1613, 1614, 1615, 1616, 1617, 1618, 1619, 1620, 1621, 1622, 1623, 1624, 1625, 1626, 1627, 1628, 1629, 1630, 1631, 1632, 1633, 1634, 1635, 1636, 1637, 1638, 1639, 1640, 1641, 1642, 1643, 1644, 1645, 1646, 1647, 1648, 1649, 1650, 1651, 1652, 1653, 1654, 1655, 1656, 1657, 1658, 1659, 1660, 1661, 1662, 1663, 1664, 1665, 1666, 1667, 1668, 1669, 1670, 1671, 1672, 1673, 1674, 1675, 1676, 1677, 1678, 1679, 1680, 1681, 1682, 1683, 1684, 1685, 1686, 1687, 1688, 1689, 1690, 1691, 1692, 1693, 1694, 1695, 1696, 1697, 1698, 1699, 1700, 1701, 1702, 1703, 1704, 1705, 1706, 1707, 1708, 1709, 1710, 1711, 1712, 1713, 1714, 1715, 1716, 1717, 1718, 1719, 1720, 1721, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1729, 1730, 1731, 1732, 1733, 1734, 1735, 1736, 1737, 1738, 1739, 1740, 1741, 1742, 1743, 1744, 1745, 1746, 1747, 1748, 1749, 1750, 1751, 1752, 1753, 1754, 1755, 1756, 1757, 1758, 1759, 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, 1768, 1769, 1770, 1771, 1772, 1773, 1774, 1775, 1776, 1777, 1778, 1779, 1780, 1781, 1782, 1783, 1784, 1785, 1786, 1787, 1788, 1789, 1790, 1791, 1792, 1793, 1794, 1795, 1796, 1797, 1798, 1799, 1800, 1801, 1802, 1803, 1804, 1805, 1806, 1807, 1808, 1809, 1810, 1811, 1812, 1813, 1814, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1822, 1823, 1824, 1825, 1826, 1827, 1828, 1829, 1830, 1831, 1832, 1833, 1834, 1835, 1836, 1837, 1838, 1839, 1840, 1841, 1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 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1. *Journal of Management Studies*, 1996, 33, 1, 1-14.

1. *Journal of the American Medical Association*, 1997; 277: 100-101.
 2. *Journal of the American Medical Association*, 1997; 277: 100-101.
 3. *Journal of the American Medical Association*, 1997; 277: 100-101.
 4. *Journal of the American Medical Association*, 1997; 277: 100-101.
 5. *Journal of the American Medical Association*, 1997; 277: 100-101.

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100

- ☐ A. a small fish making a strong jump, with a lot of noise
- ☐ B. a small fish jumping out of the water
- ☐ C. a small fish jumping out of the water and making a lot of noise
- ☐ D. a small fish jumping out of the water and making a lot of noise

- $\frac{1}{2} \log \frac{1}{2}$ bits per symbol
- $\frac{1}{2} \log \frac{1}{2}$ bits per symbol
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Now you can use your Commodore 64 to write a letter or a report, to compile a mailing list or classify your record collection, to check your bank statement or sort out your family finances (and then translate them into colourful graphics) ... all for just £5.95.

Quick to learn, easy to use, that's

Mini Office marks a long-awaited breakthrough automatically reducing the cost of personal computing.

For the first time it makes available to everyone an easy to operate version of four of the most popular business computing applications – and at a price anyone can afford.

Never before has a word processor been sold for any thing as low as £5.95. Nor a database manager. Nor a spreadsheet. Nor a graphics program.

The Mini Office contains them all.

So how was it done?

It all started with a suggestion that we should prepare a package to give readers a gentle introduction to the kind of software that businesses were running on their computers.

At that stage there was no intention that it should be an enormous package. Just a simple program that could be sold at a very low price.

We asked an expert in

processing database, spreadsheets and graphics had been turned into a full scale suite of programs covering all four applications.

In fact the only part of the total that remained was our original intention: that the package should be quick to learn and easy to use.

And despite all the extra sophistication that has been written into it, we decided that as a tribute to our readers, the price should still be kept at the very low figure originally fixed.

Why does Mini Office spend?

Using the **Word Processor** is completely straightforward. There are some of the typical initial instructions, they had to be mastered by people learning the early word processors.

You start by selecting the size of type you prefer – either normal or double size. The latter is a feature that you

people this could be the first time they can send out a perfectly typed letter without outside help.

Primary school teachers are also expected to make great

it again. It can also be printed out.

The **Database** program can be used to store a mass of information. It can be retrieved in its entirety or just



Figures on the spreadsheet can produce a bar chart.

use of the double size font, both on the screen and on hard copy printouts.

While you are using the word processor, there would pieces of information are displayed across the top of the screen.

They tell you how much time has elapsed since you started using it, the number of words you have written so far and how many characters you can key in before the computer's memory is full.

At any time you can print a key which tells you your typing speed. This is a most useful function and can play an important part in increasing your efficiency at the key board.

You can also decide the size of the margin, the line length and the tab positions. Text can be moved from one part of the document to another.

At any time you can preview the text to see how it would look when printed out.

As with all the other programs in Mini Office, your work can easily be saved and loaded when you want to use

the parts you require for a particular purpose, whenever you want it.

The database is so simple that a useful database can be created in minutes rather than days – and you certainly don't need any computer experience to set it up.

The powerful search facility is very easy to use. You can search for a particular word or words or you can enter a numeric range – such as telling the computer to find all the numbers greater or less than the one you provide.

You can store but multiple data. For instance, if you have built up a mailing list containing a list of names, addresses, telephone numbers, computers and ages, you can ask the database to provide you with a list of teachers living in Liverpool whose ages range from 25 to 30.

One powerful option allows you to replace information in the database without having to go through the whole list making amendments yourself. You could, for instance, instruct it

A unique feature is the double size text option in both printer and edit mode – perfect for young children and people with poor vision.

The word processor – with double size characters.

business software program using it, tell them what we wanted and set back to work results.

What happened next was totally unexpected. For they all came back with ideas that were so considerably inspired our original intent.

In this and what had been planned as little more than a beginners guide to word

processor had on any other word processor.

It is particularly suitable for the partially sighted – in many cases giving them their very first opportunity to use a word processor.

This means that you can use a word to compose a letter using the double size mode, and then print it out using normal size type. For many

Now on the
Commodore 64



DATA BASE SOFTWARE

in and each reference to another and replace it with another.

The **Spreadsheet** is the most of the program that makes it different from business computing. Obviously it is often pointed out that the one program alone has helped to sell more personal computers than any other. Certainly VisiCalc and its derivatives have never been shaken from their position at the top of the list of top-selling business programs.

Yet the concept is very simple – a grid worksheet of rows and columns, only part of which can be seen in your screen at any one time. Into any position on the sheet you can put numbers, labels and mathematical formulae.

And when you enter any figure it is automatically displayed throughout the rest of the sheet changing its value as may be necessary.

The Mini Office version is ideal for home finance projects

giving you with an effortless means of keeping tabs on your income and expenditure – and enabling you to work out your own budget.

In our Spreadsheet program – as well as in the Database – we have included



or a pie chart

a template file so that you can experiment with it before entering your own data.

One feature we have included which to our knowledge does not exist in any other spreadsheet is a warning device to prevent you

accidentally erasing formulae – a very useful innovation.

The **Graphics** program uses the standard business graphics – line bar and pie charts – in full colour which is something not always available on the more expensive graphics packages.

The program uses data you have already prepared in the spreadsheet. You have to identify which set of information you require to put in graph form – such as by indicating which row or column – and then which of the graphs you require.

The graph is then automatically configured exactly as you require it. If you have suitable printer capable of

producing graphics you can also print out hard copies for a permanent record.

Because our original intention was to produce a package for people new to all these applications we have produced a fully-detailed step-by-step manual.

This 32 page book gives clear instructions about how to use all four programs and in detail forms a complete introduction for first-time users.

If you want to start doing more with your micro than just playing games, this package is your ideal introduction to the four most popular applications for professional computers.

► Graphics displayed here are from the *Amiga* version and are slightly different to the *Commodore* version.

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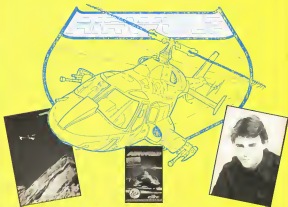
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COMPETITION

ELITE's arcade action game for the 64 captures all the excitement of the TV series Arnofwif. Now you can win Arnofwif games, watches and posters in our exclusive, easy-to-enter contest!

THE EXPLOSIVE 199 action series Arnofwif returns later this year — but Commodore 64 owners can share the excitement now with ELITE's third & final game.

Arnofwif is a state-of-the-art assault helicopter, equipped with an arsenal of weapons and high technology stealth capabilities.

Arnofwif's pilot is the daring Stray/ellow Hawk, former Vietnam chopper pilot, and the only man trained to handle the multi-million dollar helicopter.

In ELITE's game, you must pilot Arnofwif through a maze of underground caverns, attempting to penetrate the deadly defenses of General Zanzibar. He is holding captive a team of brilliant scientists, and you must eliminate his defenses with a combination of rapid thinking and quick reactions in order to succeed.

You can win a copy of Arnofwif for the 64, plus other great prizes, in our easy-to-enter contest:

• **TEN** first prize winners will get copies of Arnofwif from ELITE, plus Arnofwif digital watches, valued at £25.00, plus giant 1611 Arnofwif posters.

• **TEN** runners-up will get the game and the poster, all courtesy of Elite Software.

Just answer three questions:

• **WHAT** was the name of the helicopter featured in a recent film starring Ray Robinson?

• **WHICH** type of helicopter did James Bond fly in the film *You Only Live Twice*?

• **WHAT** popular TV series set in Korea featured helicopters serving a legend?

Put your answers on a POSTCARD and complete this 1611-form. It's easy to fly with Arnofwif because... It is an apt and amusing manner in fifteen words or fewer. Then post your entry to Arnofwif Contest, Commodore Magazine, 12/15 Little Newport Street, London WC2H 7PP, as early as the last day of June. Normal competition rules apply and winners will be

announced in the August issue.

TEN WINNERS of the April Hobbit ringer game have now been selected. Each of the fifty winners, who had to study the wordpuzzle and open the odd wood case, will receive a copy of the Disk Hobbit from Melbourne House.

The lucky winners will get a BB/Treasure/Cornish Sorcery 64 video synthesizer, having written the best options for our April contest. The winners are: D. Burre, London; S. McCarthy, Newark; T. Whithead, Tadworth; C. Nichols, Stoney; P. Welch, Lower Saddle; L. Powell, London; A. Brown, Amsterdam; T. Moker, Denpwell; P. Lawler, Oxford; S. Lee, London.

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ELEPHANT NEVER FORGETS

Labov, W. 1972. *Language in the city: New York City in the history of American English*. New York: Academic Press.

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